













THE  
ENCYCLOPÆDIA BRITANNICA

A  
DICTIONARY

OF  
ARTS, SCIENCES, AND GENERAL LITERATURE

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By W. H. DEPUY, D.D., LL.D.,

BRINGING EACH VOLUME UP TO DATE.

VOLUME I

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## PREFATORY NOTICE.

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THE ENCYCLOPÆDIA BRITANNICA has long deservedly held a foremost place amongst English Encyclopædias. It secured this position by its plan and method of treatment, the plan being more comprehensive, and the treatment a happier blending of popular and scientific exposition than had previously been attempted in any undertaking of the kind. The distinctive feature of the work was that it gave a connected view of the more important subjects under a single heading, instead of breaking them up into a number of shorter articles. This method of arrangement had a twofold advantage. The space afforded for extended exposition helped to secure the services of the more independent and productive minds who were engaged in advancing their own departments of scientific inquiry. As a natural result, the work, while surveying in outline the existing field of knowledge, was able at the same time to enlarge its boundaries by embodying, in special articles, the fruits of original observation and research. The Encyclopædia Britannica thus became, to some extent at least, an instrument as well as a register of scientific progress.

This characteristic feature of the work will be retained and made even more prominent in the New Edition, as the list of contributors already published sufficiently indicates. In some other respects, however, the plan will be modified, to meet the multiplied requirements of advancing knowledge. In the first place, the rapid progress of science during the last quarter of a century necessitates many changes, as well as a considerable increase in the number of headings devoted to its exposition. In dealing with vast wholes, such as Physics and Biology, it is always a difficult problem how best to distribute the parts under an alphabetical arrangement, and perhaps impossible to make such a distribution perfectly consistent and complete. The difficulty of distribution is increased by the complexity of divisions and multiplication of details, which the progress of science involves, and which constitute indeed the most authentic note of advancing knowledge. This sign of progress is reflected in extensive changes of terminology and nomenclature, vague general headings once appropriate and sufficient, such as *Animalcule*, being of necessity abandoned for more precise and significant equivalents.



But, since the publication of the last Edition, science, in each of its main divisions, may be said to have changed as much in substance as in form. The new conceptions introduced into the Biological Sciences have revolutionized their points of view, methods of procedure, and systems of classification. In the light of larger and more illuminating generalizations, sections of the subject, hitherto only partially explored, have acquired new prominence and value, and are cultivated with the keenest interest. It is enough to specify the researches into the ultimate structures, serial gradations, and progressive changes of organic forms, into the laws of their distribution in space and time, and into the causes by which these phenomena have been brought about. The results of persistent labor in these comparatively new fields of inquiry will largely determine the classifications of the future. Meanwhile the whole system of grouping, and many points of general doctrine, are in a transition state; and what is said and done in these directions must be regarded, to a certain extent at least, as tentative and provisional. In these circumstances, the really important thing is, that whatever may be said on such unsettled questions should be said with the authority of the fullest knowledge and insight, and every effort has been made to secure this advantage for the New Edition of the Encyclopædia.

The recent history of Physics is marked by changes both of conception and classification almost equally great. In advancing from the older dynamic to the newer potential and kinetic conceptions of power, this branch of science may be said to have entered on a fresh stage, in which, instead of regarding natural phenomena as the result of forces acting between one body and another, the energy of a material system is looked upon as determined by its configuration and motion, and the ideas of configuration, motion and force are generalized to the utmost extent warranted by their definitions. This altered point of view, combined with the far-reaching doctrines of the correlation of forces and the conservation of energy, has produced extensive changes in the nomenclature and classification of the various sections of physics; while the fuller investigations into the ultimate constitution of matter, and into the phenomena and laws of light, heat and electricity, have created virtually new sections, which must now find a place in any adequate survey of scientific progress. The application of the newer principles to the mechanical arts and industries has rapidly advanced during the same period, and will require extended illustration in many fresh directions. Mechanical invention has, indeed, so kept pace with the progress of science, that in almost every department of physics improved machines and processes have to be described, as well as fresh discoveries and altered points of view. In recent as in earlier times, invention and discovery have acted and reacted on each other to a marked extent, the instruments of finer measurement and analysis having directly contributed to the finding out of physical properties and laws. The spectroscope is a signal instance of the extent to which in our day scientific discovery is indebted to appropriate instruments of observation and analysis.



These extensive changes in Physics and Biology involve corresponding changes in the method of their exposition. Much in what was written about each a generation ago is now of comparatively little value. Not only therefore does the system of grouping in these sciences require alteration and enlargement; the articles themselves must, in the majority of instances, be written afresh rather than simply revised. The scientific department of the work will thus be to a great extent new. In attempting to distribute the headings for the New Edition, so as fairly to cover the ground occupied by modern science, I have been largely indebted to Professor Huxley and Professor Clerk Maxwell, whose valuable help in the matter I am glad to have an opportunity of acknowledging.

Passing from Natural and Physical Science to Literature, History and Philosophy, it may be noted that many sections of knowledge connected with these departments display fresh tendencies, and are working towards new results, which, if faithfully reflected, will require a new style of treatment. Speaking generally, it may be said that human nature and human life are the great objects of inquiry in these departments. Man, in his individual powers, complex relationships, associated activities and collective progress, is dealt with alike in Literature, History and Philosophy. In this wider aspect, the rudest and most fragmentary records of savage and barbarous races, the earliest stories and traditions of every lettered people, no less than their developed literatures, mythologies and religions, are found to have a meaning and value of their own. As yet the rich materials thus supplied for throwing light on the central problems of human life and history have only been very partially turned to account. It may be said, indeed, that their real significance is perceived and appreciated, almost for the first time in our own day. But under the influence of the modern spirit, they are now being dealt with in a strictly scientific manner. The available facts of human history, collected over the widest areas, are carefully co-ordinated and grouped together, in the hope of ultimately evolving the laws of progress, moral and material, which underlie them, and which, when evolved, will help to connect and interpret the whole onward movement of the race. Already the critical use of the comparative method has produced very striking results in this new and stimulating field of research. Illustrations of this are seen in the rise and rapid development of the comparatively modern science of Anthropology, and the successful cultivation of the assistant sciences, such as Archæology, Ethnography and Philology, which directly contribute materials for its use. The activity of geographical research in both hemispheres, and the large additions recently made to our knowledge of older and newer continents by the discoveries of eminent travelers and explorers, afford the anthropologist additional materials for his work. Many branches of mental philosophy, again, such as Ethics, Psychology and Æsthetics, while supplying important elements to the new science, are at the same time very largely interested in its results, and all may be regarded as subservient to the wider problems raised by the philosophy of history. In the New Edition of the

Encyclopædia full justice will, it is hoped, be done to the progress made in these various directions.

It may be well, perhaps, to state at the outset the position taken by the Encyclopædia Britannica in relation to the active controversies of the time—Scientific, Religious and Philosophical. This is the more necessary, as the prolific activity of modern science has naturally stimulated speculation, and given birth to a number of somewhat crude conjectures and hypotheses. The air is full of novel and extreme opinions, arising often from a hasty or one-sided interpretation of the newer aspects and results of modern inquiry. The higher problems of philosophy and religion, too, are being investigated afresh from opposite sides in a thoroughly earnest spirit, as well as with a directness and intellectual power, which is certainly one of the most striking signs of the times. This fresh outbreak of the inevitable contest between the old and the new is a fruitful source of exaggerated hopes and fears, and of excited denunciation and appeal. In this conflict a work like the Encyclopædia is not called upon to take any direct part. It has to do with knowledge rather than opinion, and to deal with all subjects from a critical and historical, rather than a dogmatic, point of view. It cannot be the organ of any sect or party in Science, Religion or Philosophy. Its main duty is to give an accurate account of the facts and an impartial summary of results in every department of inquiry and research. This duty will, I hope, be faithfully performed.

T. S. BAYNES.



# ENCYCLOPÆDIA BRITANNICA.

## A

**A**, THE first symbol of every Indo-European alphabet, denotes also the primary vowel sound. This coincidence is probably only accidental. The alphabets of Europe, and perhaps of India also, were of Semitic origin, and in all the Semitic alphabets except one, this same symbol (in modified forms) holds the first place; but it represents a peculiar breathing, not the vowel *a*,—the vowels in the Semitic languages occupying a subordinate place, and having originally no special symbols. When the Greeks, with whom the vowel sounds were much more important, borrowed the alphabet of Phœnicia, they required symbols to express those vowels, and used for this purpose the signs of breathings which were strange to them, and therefore needed not to be preserved; thus the Phœnician equivalent of the Hebrew *aleph* became *alpha*; it denoted, however, no more a guttural breathing, but the purest vowel sound. Still, it would be too much to assume that the Greeks of that day were so skilled in phonetics that they assigned the first symbol of their borrowed alphabet to the *a*-sound, *because* they knew that sound to be the most essential vowel.

This primary vowel-sound (the sound of *a* in *father*) is produced by keeping the passage through which the air is vocalised between the glottis and the lips in the most open position possible. In sounding all other vowels, the air-channel is narrowed by the action either of the tongue or the lips. But here neither the back of the tongue is raised (as it is in sounding *o* and other vowels), so that a free space is left between the tongue and the uvula, nor is the front of the tongue raised (as in sounding *e*), so that the space is clear between the tongue and the palate. Again, no other vowel is pronounced with a wider opening of the lips; whereas the aperture is sensibly reduced at each side when we sound *o*, and still more when we sound *u* (that is, *yoo*). The whole channel, therefore, from the glottis, where the breath first issues forth to be modified in the oral cavity, to the lips, where it finally escapes, is thoroughly open. Hence arises the great importance of the sound, by reason of its thoroughly non-consonantal character. All vowels may be defined as open positions

of the speech-organs, in which the breath escapes without any stoppage, friction, or sibilation arising from the contact of those organs, whereas consonants are heard when the organs open after such contact more or less complete. Now, all vowels except *a* are pronounced with a certain contraction of the organs; thus, in sounding the *i* (the English *e*-sound), the tongue is raised so as almost to touch the palate, the passage left being so close, that if the tongue were suffered for a second to rest on the palate, there would be heard not *i* but *y*; and a similar relation exists between *u* and *w*. This is commonly expressed by calling *y* and *w* semi-vowels. We might more exactly call *i* and *u* consonantal-vowels; and as an historic fact, *i* does constantly pass into *y*, and *u* into *w*, and *vice versa*. But no consonant has this relation to the *a*-sound; it has absolutely no affinity to any consonant; it is, as we have called it, the one primary essential vowel.

The importance of this sound may be shown by historical as well as by physiological evidence. We find by tracing the process of phonetic change in different languages, that when one vowel passes into another, it is the pure *a*-sound which thus assumes other forms, whereas other vowels do not pass into the *a*-sound, though sometimes the new sound may have this symbol. Roughly speaking, we might express the general character of vowel change by drawing two lines from a common point, at which *a* is placed. One of these lines marks the progress of an original *a* (*ah*-sound) through *e* (*a*-sound), till it sinks finally to *i* (*e*-sound); the other marks a similar degradation, through *o* to *u* (*oo*-sound). This figure omits many minor modifications, and is subject to some exceptions in particular languages. But it represents fairly in the main the general process of vowel change. Now, we do not assert that there ever was a time when *a* was the only existing vowel, but we do maintain that in numberless cases an original *a* has passed into other sounds, whereas the reverse process is excessively



rare. Consequently, the farther we trace back the history of language, the more instances of this vowel do we find; the more nearly, if not entirely, does it become the one starting point from which all vowel-sound is derived.

It is principally to the effort required to keep this sound pure that we must attribute the great corruption of it in all languages, and in none more than our own. Indeed, in English, the short *a*-sound is never heard pure; it is heard in Scotland, *e.g.*, in *man*, which is quite different from the same word on English lips. We have it, however, long in *father*, &c., though it is not common. It has passed into a great many other sounds, all of which are denoted in a most confusing way by the original symbol, and some by other symbols as well. Thus *a* denotes—(1.) The English vowel-sound in *man*, perhaps the most common of all the substitutes, dating from the 17th century. (2.) It appears in *want*; for this sound *o* is also employed, as in *on*. (3.) A more open sound is heard in *all* (also denoted by *au* in *auk*, and *av* in *awl*). (4.) Very commonly it represents the continental *e*, as in *ale* (here also we have the symbol *ai* in *ail*). (5.) It is found in *dare* and many similar words, where the sound is really the *e* of *dén*, prolonged in the utterance; here also *ai* is sometimes an equivalent, as in *air*. Then (6) there is a sound which is not that of *a* either in *man* or in *father*, but something between the two. It is heard in such words as *ask*, *pass*, *grant*, &c. All these may be, and often are, pronounced with the sound either of *man* or of *father*; still, we do often hear in them a clearly distinguishable intermediate sound, which ought to have a special symbol. Lastly (7), there is the dull sound heard in final unaccentuated syllables, *e.g.*, in the word *final* itself. It is that to which all unaccentuated syllables tend; but it is also often heard even in monosyllables, where it is represented by every other vowel-symbol in the language, *e.g.*, in *her*, *sir*, *son*, *sun*. This Protean sound is commonly called the neutral vowel; it occurs in all languages, but perhaps in none so frequently as in English. This great variety of sounds, which are all denoted among us by one symbol, clearly shows the insufficiency of our written alphabet.

As in English, so in Sanskrit, the short *ah*-sound was lost, and was replaced regularly by the neutral sound. This was regarded by the grammarians as inherent in every consonant, and therefore was only written at the beginning of a word; in fact, it is the smallest amount of vowel-sound requisite to float a consonant. Long *a*, however, kept its sound pure, and does so still in the vernaculars of India. In Latin the sound was probably pure, both short and long, and it has been preserved so in the Romance languages down to the present day. In Greek there was considerable variation, proved in one case at least by a variation of symbol; in Ionic *a* commonly passed into *η*, a symbol which probably denoted the modern Italian open *e*; but possibly the close *e*, that is, the English *a* in *ale*. On the other hand, it is probable that the Doric *a* approximated to an *o*, being sounded as *a* in our word *want*; and it is likely that this variation was the *πλαταιωμός* which the grammarians attribute to the Dorians. This is commonly supposed to have been the retention of *a* where the Ionic had *η*; but that was not peculiar to the Dorians, being common to all the Greeks except the Ionians. In the north of Europe we find a similar tendency to give to *a* an *o*-sound; thus in Norse, *aa* is sounded as an open *o*. By a further extension in the north of England, at least in such parts as have been specially exposed to Norwegian influence, *aw* has the sound of *o*; *e.g.*, *law* is pronounced *lo*.

*A* is frequently used as a prefix in lieu of some fuller form in old English. Thus it stands for the preposition *on* (O.E. *an*) in *away*, *again*, *afoot*, *asleep*; for *off* in *adown* (O.E. *of-dune*); and seems to be intensive in *athirst* (O.E.

*of-thirst*). Sometimes, especially with verbs, it represents the old English *ð*, which in old High German appears as *ur* or *er*, and in modern German as *er*, which signifies the completion of an action, as in *erwachen*, to which *awake* corresponds. Frequently no special force seems to be added by the prefix, as in *abide*, *arise*, &c. Sometimes *a* appears as the representative of the prefix commonly used in past participles, which has the form *ge* in German, and *ge* and *y* in old English, *e.g.*, in *ago* or *agone*; compare *aware* (O.E. *gevaere*), among (O.E. *gemang*), &c. *A* also stood for the preposition *an* (*on*) in such expressions (now obsolete) as *a-doing*, *a-making*, where *doing* and *making* are verbal nouns. Lastly, it represents the prepositions *on* or *of* in the phrases *now-a-days*, *Jack-a-lantern*, and others.

The place that *A* occupies in the alphabet accounts for its being much employed as a mark or symbol. It is used, for instance, to name the sixth note of the gamut in music; in some systems of notation it is a numeral (see ARITHMETIC); and in Logic it denotes a universal affirmative proposition (see LOGIC). In algebra, *a* and the first letters of the alphabet are employed to represent known quantities. *Al* marks the best class of vessels in Lloyd's Register of British and Foreign Shipping. In the old poets, "*A per se*" is found, meaning the highest degree of excellence; as when Chaucer calls Creseide "*the floure and A per se* of Troye and Grece."

*A* was the first of the eight *literæ nundinales* at Rome, and on this analogy it stands as the first of the seven Dominical letters.

It is often used as an abbreviation, as in A.D. for *anno domini*, A.M. for *ante meridiem*, A.B. and A.M. for *artium baccalaureus* and *artium magister*. In commerce *A* stands for *accepted*.

(J. P.)

*AA*, the name of about forty small European rivers. The word is derived from the old German *aha*, cognate to the Latin *agua*, water. The following are the more important streams of this name:—a river of Holland, in North Brabant, which joins the Dommel at Bois-le-Duc; two rivers in the west of Russia, both falling into the Gulf of Livonia, near Riga, which is situated between them; a river in the north of France, falling into the sea at Gravelines, and navigable as far as St Omer; and a river of Switzerland, in the cantons of Lucerne and Aargau, which carries the waters of Lakes Baldeker and Hallwyler into the Aar.

AACHEN. See AIX-*LA-CHAPELLE*.

AALBORG, a city and seaport of Denmark, is situated on the Lümfiord, about 15 miles from its junction with the Cattegat. It is the capital of the district of the same name, one of the subdivisions of the province of Jütland. The city is a place of considerable commercial importance, and contains a cathedral and a school of navigation. Soap, tobacco, and leather are manufactured; there are several distilleries; and the herring fishery is extensively prosecuted. Grain and herring are largely exported, as are also to a smaller extent wool, cattle, skins, tallow, salt provisions, and spirits. The harbour, which is good and safe, though difficult of access, is entered by about 800 vessels annually, and there is direct steam communication with Copenhagen. The district is celebrated for its breed of horses. Population (1870), 11,953.

AALLEN, a walled town of Würtemberg, pleasantly situated on the Kocher, at the foot of the Swabian Alps, about 50 miles E. of Stuttgart. Woollen and linen goods are manufactured, and there are ribbon looms and tanneries in the town, and large iron works in the neighbourhood. Aalen was a free imperial city from 1360 till 1802, when it was annexed to Würtemberg. Population (1871), 5552.

AAR, or AARE, the most considerable river in Switzerland, after the Rhine and Rhone. It rises in the glaciers



of the Finster-Aarhorn, Schreckhorn, and Grimsel, in the canton of Bern; and at the Handeck in the valley of Hasli forms a magnificent water-fall of above 150 feet in height. It then falls successively into the lakes Brienz and Thun, and, emerging from the latter, flows through the cantons of Bern, Soleure, and Aargau, emptying itself into the Rhine, opposite Waldshut, after a course of about 170 miles. Its principal tributary streams are the Kander, Saane, and Thiele on the left, and the Emmen, Surin, Aa, Reuss, and Limmat on the right. On its banks are situated Unterseen, Thun, Bern, Soleure or Solothurn, Aarburg, and Aarau. The Aar is a beautiful silvery river, abounding in fish, and is navigable from the Rhine as far as the Lake of Thun. Several small rivers in Germany have the same name.

AARAU, the chief town of the canton of Aargau in Switzerland, is situated at the foot of the Jura mountains, on the right bank of the river Aar, 41 miles N.E. of Bern. It is well built, and contains a town-hall, barracks, several small museums, and a library rich in histories of Switzerland. There is a cannon foundry at Aarau, and among the principal manufactures are silk, cotton, and leather; also cutlery and mathematical instruments, which are held in great repute. The slopes of the neighbouring mountains are partially covered with vines, and the vicinity of the town is attractive. About ten miles distant along the right bank of the Aar are the famous baths of Schinznach. Population, 5449.

AARD-VARK (*earth-pig*), an animal very common in South Africa, measuring upwards of three feet in length, and having a general resemblance to a short-legged pig. It feeds on ants, and is of nocturnal habits, and very timid and harmless. Its flesh is used as food, and when suitably preserved is considered a delicacy. The animal is the only known species of its genus (*Orycteropus*), and belongs to the order *Edentata* of the mammalia. The same prefix *Aard* appears in the name of the AARD-WOLF (*Proteles Lalandii*), a rare animal found in Caffraria, which is said to partake of the characters of the dog and civet. See MAMMALIA.

AARGAU (French, *ARGOVIE*), one of the cantons of Switzerland, derives its name from the river which flows through it, Aar-gau being the province or district of the Aar. It is bounded on the north by the Rhine, which divides it from the duchy of Baden, on the east by Zurich and Zug, on the south by Lucerne, and on the west by Bern, Soleure or Solothurn, and Basel. It has an area of 502½ square miles. By the census of 1870, the number of inhabitants was 193,873, showing an increase during the preceding ten years of 4665. Aargau stands sixth among the Swiss cantons in density of population, having 395 inhabitants to the square mile. The statistics of 1870 show that of the inhabitants 107,703 were Protestants, 89,180 Catholics, and 1541 Jews. German is the language almost universally spoken.

Aargau is the least mountainous canton of Switzerland. It forms part of a great table-land to the north of the Alps and the east of the Jura, having a general elevation of from 1200 to 1500 feet. The hills do not rise to any greater height than 1800 feet above this table-land, or 3000 feet above the level of the sea. The surface of the country is beautifully diversified, undulating tracts and well-wooded hills alternating with fertile valleys watered by the Aar and its numerous tributaries, and by the rivulets which flow northward into the Rhine. Although moist and variable, the climate is milder than in most parts of Switzerland.

The minerals of Aargau are unimportant, but remarkable palæontological remains are found in its rocks. The soil to the left of the Aar is a stiff clay, but to the right it is light and productive. Agriculture is in an advanced state, and great attention is given to the rearing of cattle. There

are many vineyards, and much fruit is grown. The canton is distinguished by its industry and its generally diffused prosperity. Many of the inhabitants are employed in the fishings on the Aar, and in the navigation of the river. In the villages and towns there are considerable manufactures of cotton goods, silk, and linen. The chief exports are cattle, hides, cheese, timber, raw cotton, yarn, cotton cloths, silk, machinery, and wooden wares; and the imports include wheat, wine, salt, leather, and iron. The most important towns are Aarau, Baden, Zofingen, and Laufenburg, and there are mineral springs at Baden, Schinznach, Leerau, and Niederweil. The Swiss Junction Railway crosses the Rhine near Waldshut, and runs south through the canton to Turgi, whence one line proceeds S.E. to Zurich, and another S.W. to Aarau and Olben.

Until 1798, Aargau formed part of the canton of Bern, but when the Helvetic Republic was proclaimed, it was erected into a separate canton. In 1803 it received a considerable accession of territory, in virtue of the arrangement under which the French evacuated Switzerland. According to the law whereby the cantons are represented in the National Council by one member for every 20,000 inhabitants, Aargau returns ten representatives to that assembly. The internal government is vested in a legislative council elected by the body of the people, while a smaller council of seven members is chosen by the larger body for the general administration of affairs. The resources of Aargau are stated to amount to about a million sterling; its revenue in 1867 was nearly £82,000, and the expenditure slightly greater. There is a public debt of about £40,000. The canton is divided into eleven districts, and these again are subdivided into forty-eight circles. There is a court of law for each district, and a superior court for the whole canton, to which cases involving sums above 160 francs can be appealed. Education is compulsory; but in the Roman Catholic districts the law is not strictly enforced. By improved schools and other appliances great progress has been made in education within the last thirty or forty years.

AARHUUS, a city and seaport of Denmark, situated on the Cattegat, in lat. 56° 9' N., long. 10° 12' E. It is the chief town of a fertile district of the same name, one of the subdivisions of Jutland. The cathedral of Aarhuus is a Gothic structure, and the largest church in Denmark. The town also contains a lyceum, museum, and library. Aarhuus is a place of extensive trade. It has a good and safe harbour, has regular steam communication with Copenhagen, and is connected by rail with Viborg and the interior of the country. Agricultural produce, spirits, leather, and gloves are exported, and there are sugar refineries, and manufactures of wool, cotton and tobacco. Population (1870), 15,020.

AARON, the first high-priest of the Jews, eldest son of Amram and Jochebed, of the tribe of Levi, and brother of Moses and Miriam. When Moses was commissioned to conduct the Israelites from Egypt to Canaan, Aaron was appointed to assist him, principally, it would appear, on account of his possessing, in a high degree, persuasive readiness of speech. On the occasion of Moses' absence in Mount Sinai (to which he had gone up to receive the tables of the law), the Israelites, regarding Aaron as their leader, clamorously demanded that he should provide them with a visible symbolic image of their God for worship. He weakly complied with the demand, and out of the ornaments of gold contributed for the purpose cast the figure of a calf, this form being doubtless chosen in recollection of the idols of Egypt. In obedience to instructions given by God to Moses, Aaron was appointed high-priest; his sons and descendants, priests; and his tribe was set apart as the sacerdotal caste. The office of high-priest was held by Aaron for nearly forty years, till the time of his

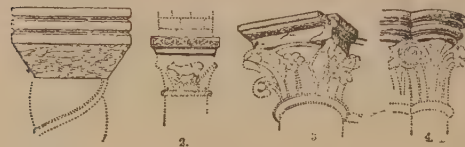
death, which took place on Mount Hor, when he was 123 years old.

AARSENS, FRANCIS VAN (1572-1641), one of the greatest diplomatists of the United Provinces. He represented the States-General at the Court of France for many years, and was also engaged in embassies to Venice, Germany, and England. His great diplomatic ability appears from the memoirs he wrote of his negotiations in 1624 with Richelieu, who ranked him among the three greatest politicians of his time. A deep stain rests on the memory of Aarsens from the share he had in the death of Barneveldt, who was put to death by the States-General, after the semblance of a trial, in 1619.

ABABDE, an African tribe occupying the country between the Red Sea and the Nile, to the S. of Kosseir, nearly as far as the latitude of Darr. Many of the race have settled on the eastern bank of the Nile, but the greater part still live like Bedouins. They are a distinct race from the Arabs, and are treacherous and faithless in their dealings. They have few horses; when at war with other tribes, they fight from camels, their breed of which is famed. They possess considerable property, and trade in senna, and in charcoal made from acacia wood, which they send as far as Cairo.

ABACA or ABAKA, a name given to the *Musa textilis*, the plant that produces the fibre called Manilla Hemp, and also to the fibre itself.

ABACUS, an architectural term (from the Gr. *ἀβάξ*, a tray or flat board) applied to the upper part of the capital of a column, pier, &c. The early form of an abacus is



Forms of the Abacus.

simply a square flat stone, probably derived from the Tuscan order. In Saxon work it is frequently simply chamfered, but sometimes grooved, as in the crypt at Repton (fig. 1), and in the arcade of the refectory at Westminster. The abacus in Norman work is square where the columns are small; but on larger piers it is sometimes octagonal, as at Waltham Abbey. The square of the abacus is often sculptured, as at the White Tower and at Alton (fig. 2). In early English work the abacus is generally circular, and in larger work a continuation of circles (fig. 4), sometimes octagonal, and occasionally square.

The mouldings are generally rounds, which overhang deep hollows. The abacus in early French work is generally square, as at Blois (fig. 3). The term is applied in its diminutive form (Abaciscus) to the chequers or squares of a tessellated pavement.

ABACUS also signifies an instrument employed by the ancients for arithmetical calculations; pebbles, bits of bone, or coins, being used as counters. The accompanying figure (5) of a Roman abacus is taken from an ancient monument. It contains seven long and seven shorter rods or bars, the former having four perforated beads running on

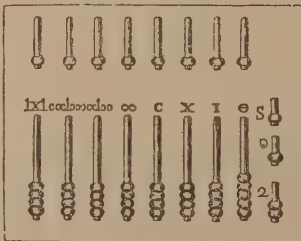


Fig. 5.—Roman Abacus.

them, and the latter one. The bar marked I indicates units, X tens, and so on up to millions. The beads on the shorter bars denote fives,—five units, five tens, &c. The rod  $\Theta$  and corresponding short rod are for marking ounces; and the short quarter rods for fractions of an ounce.

The *Swan-Pan* of the Chinese (fig. 6) closely resembles the Roman abacus in its construction and use. Computations are made with it by means of balls of bone or ivory running on slender bamboo rods similar to the simpler board, fitted up with beads strung on wires, which is employed in teaching the rudiments of arithmetic in elementary schools.

ABÆ, a town of ancient Greece in the E. of Phocis, famous for a temple and oracle of Apollo. The temple was plundered and burned by the Persians (B.C. 480), and again by the Bœotians (B.C. 346), and was restored on a smaller scale by Hadrian. Remains of the temple and town may still be traced on a peaked hill near Exarkho. See Leake's *Northern Greece*.

ABAKANSK, a fortified town of Siberia, in the government of Yeniseisk, on the river Abakan, near its confluence with the Yenisei. Lat. 54° N.; long. 91° 14' E. This is considered the mildest and most salubrious place in Siberia, and is remarkable for the tumuli in its neighbourhood, and for some statues of men from seven to nine feet high, covered with hieroglyphics. Population about 1000.

ABANA and PHARPAR, "rivers of Damascus" (2 Kings v. 12), are now generally identified with the Barada and the Awaj respectively. The former flows through the city of Damascus; the Awaj, a smaller stream, passes eight miles to the south. Both run from west to east across the plain of Damascus, which owes to them much of its fertility, and lose themselves in marshes, or lakes, as they are called, on the borders of the great Arabian desert. Mr Macgregor, who gives an interesting description of these rivers in his *Rob Roy on the Jordan*, affirms that "as a work of hydraulic engineering, the system and construction of the canals by which the Abana and Pharpar are used for irrigation, may be still considered as the most complete and extensive in the world."

ABANCAY, a town of Peru, in the department of Cuzco, 65 miles W.S.W. of the town of that name. It lies on the river Abancay, which is here spanned by one of the finest bridges in Peru. Rich crops of sugar-cane are produced in the district, and the town has extensive sugar refineries. Hemp is also cultivated, and silver is found in the mountains. Population, 1200.

ABANDONMENT, in *Marine Assurance*, is the surrendering of the ship or goods insured to the insurers, in the case of a constructive total loss of the thing insured. There is an absolute total loss entitling the assured to recover the full amount of his insurance wherever the thing insured has ceased to exist to any useful purpose,—and in such a case abandonment is not required. Where the thing assured continues to exist in specie, yet is so damaged that there is no reasonable hope of repair, or it is not worth the expense of bringing it, or what remains of it, to its destination, the insured may treat the case as one of a total loss (in this case called constructive total loss), and demand the full sum insured. But, as the contract of insurance is one of indemnity, the insured must, in such a case, make an express cession of all his right to the recovery of the subject insured to the underwriter by abandonment. The insured must intimate his intention to abandon, within a

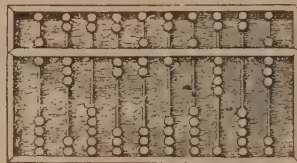


Fig. 6.—Chinese Swan-Pan.



reasonable time after receiving correct information as to the loss; any unnecessary delay being held as an indication of his intention not to abandon. An abandonment when once accepted is irrevocable; but in no circumstances is the insured obliged to abandon. After abandonment, the captain and crew are still bound to do all in their power to save the property for the underwriter, without prejudice to the right of abandonment; for which they are entitled to wages and remuneration from the insurers, at least so far as what is saved will allow. See Arnould, Marshall, and Park, on the *Law of Insurance*, and the judgment of Lord Abinger in *Roux v. Salvador*, 3 Bing. N.C. 266, Tudor's *Leading Cases*, 139.

ABANDONMENT has also a legal signification in the law of railways. Under the Acts 13 and 14 Vict. c. 83, 14 and 15 Vict. c. 64, 30 and 31 Vict. c. 126, and 32 and 33 Vict. c. 114, the Board of Trade may, on the application of a railway company, made by the authority and with the consent of the holders of three-fifths of its shares or stock, and on certain conditions specified in the Acts, grant a warrant authorising the abandonment of the railway or a portion of it. After due publication of this warrant, the company is released from all liability to make, maintain, or work the railway, or portion of the railway, authorised to be abandoned, or to complete any contracts relating to it, subject to certain provisions and exceptions.

ABANDONING a young child under two years of age, so that its life shall be endangered, or its health permanently injured, or likely to be so, is in England a misdemeanour, punishable by penal servitude or imprisonment, 24 and 25 Vict. c. 100, § 273. In Scotland abandoning or exposing an infant is an offence at common law, although no evil consequences should happen to the child.

ABANO, a town of Northern Italy, 6 miles S.W. of Padua. There are thermal springs in the neighbourhood, which have been much resorted to by invalids for bathing, both in ancient and modern times. They were called by the Romans *Aponi Fons*, and also *Aquæ Patavinæ*. Population of Abano, 3000.

ABANO, PIETRO D', known also as *Petrus de Apono* or *Aponensis*, a distinguished physician and philosopher, was born at the Italian town from which he takes his name in 1250, or, according to others, in 1246. After visiting the east in order to acquire the Greek language, he went to study at Paris, where he became a doctor of medicine and philosophy. In Padua, to which he returned when his studies were completed, he speedily gained a great reputation as a physician, and availed himself of it to gratify his avarice by refusing to visit patients except for an exorbitant fee. Perhaps this as well as his meddling with astrology caused the charge to be brought against him of practising magic, the particular accusations being that he brought back into his purse, by the aid of the devil, all the money he paid away, and that he possessed the philosopher's stone. He was twice brought to trial by the Inquisition; on the first occasion he was acquitted, and he died (1316) before the second trial was completed. He was found guilty, however, and his body was ordered to be exhumed and burned; but a friend had secretly removed it, and the Inquisition had, therefore, to content itself with the public proclamation of its sentence and the burning of Abano in effigy. In his writings he expounds and advocates the medical and philosophical systems of Averroes and other Arabian writers. His best known works are the *Conciliator differentiarum quas inter philosophos et medicos versantur* (Mantua, 1472, Venice, 1476), and *De venenis eorumque remediis* (1472), of which a French translation was published at Lyons in 1593.

ABARIS, the Hyperborean, a celebrated sage of antiquity, who visited Greece about 570 B.C., or, according to

others, a century or two earlier. The particulars of his history are differently related by different authors, but all accounts are more or less mythical. He is said to have travelled over sea and land, riding on an arrow given him by Apollo, to have lived without food, to have delivered the whole earth from a plague, &c. Various works in prose and verse are attributed to Abaris by Suidas and others, but of these we have no certain information.

ABATEMENT, ABATE, from the French *abattre*, *abater*, to throw down, demolish. The original meaning of the word is preserved in various legal phrases. The abatement of a nuisance is the remedy allowed by law to a person injured by a public nuisance of destroying or removing it by his own act, provided he commit no breach of the peace in doing so. In the case of private nuisances abatement is also allowed, provided there be no breach of the peace, and no damage be occasioned beyond what the removal of the nuisance requires.

Abatement of freehold takes place where, after the death of the person last seised, a stranger enters upon lands before the entry of the heir or devisee, and keeps the latter out of possession. It differs from intrusion, which is a similar entry by a stranger on the death of a tenant for life, to the prejudice of the reversioner, or remainder man; and from disseisin, which is the forcible or fraudulent expulsion of a person seised of the freehold.

Abatement among legatees (*defalcatis*) is a proportionate deduction which their legacies suffer when the funds out of which they are payable are not sufficient to pay them in full.

Abatement in pleading is the defeating or quashing of a particular action by some matter of fact, such as a defect in form or personal incompetency of the parties suing, pleaded by the defendant. Such a plea is called a plea in abatement; and as it does not involve the merits of the cause, it leaves the right of action subsisting. Since 1852 it has been competent to obviate the effect of such pleas by amendment, so as to allow the real question in controversy between the parties to be tried in the same suit.

In litigation an action is said to abate or cease on the death of one of the parties.

ABATEMENT, or REBATE, is a discount allowed for prompt payment; it also means a deduction sometimes made at the custom-house from the fixed duties on certain kinds of goods, on account of damage or loss sustained in warehouses. The rate and conditions of such deductions are regulated by Act 16 and 17 Vict. c. 107.

ABATI, or DELL'ABBATO, NICCOLO, a celebrated fresco-painter of Modena, born in 1512. His best works are at Modena and Bologna, and have been highly praised by Zanotti, Algarotti, and Lanzi. He accompanied Primaticcio to France, and assisted in decorating the palace at Fontainebleau (1552-1571). His pictures exhibit a combination of skill in drawing, grace, and natural colouring. Some of his easel pieces in oil are in different collections; one of the finest, now in the Dresden Gallery, represents the martyrdom of St Peter and St Paul. Abati died at Paris in 1571.

ABATTOIR, from *abattre*, primarily signifies a slaughter-house proper, or place where animals are killed as distinguished from *boucheries* and *étaux publics*, places where the dead meat is offered for sale. But the term is also employed to designate a complete meat market of which the abattoir proper is merely part.

Perhaps the first indication of the existence of abattoirs may be found in the system which prevailed under the Emperors in ancient Rome. A corporation or guild of butchers undoubtedly existed there, which delegated to its officers the duty of slaughtering the beasts required to supply the city with meat. The establishments requisite

for this purpose were at first scattered about the various streets, but were eventually confined to one quarter, and formed the public meat market. This market, in the time of Nero, was one of the most imposing structures in the city, and some idea of its magnificence has been transmitted to us by a delineation of it preserved on an ancient coin. As the policy and customs of the Romans made themselves felt in Gaul, the Roman system of abattoirs, if it may be so called, was introduced there in an imperfect form. A clique of families in Paris long exercised the special function of catering for the public wants in respect of meat. But as the city increased in magnitude and population, the necessity of keeping slaughter-houses as much as possible apart from dwelling-houses became apparent. As early as the time of Charles IX., the attention of the French authorities was directed to the subject, as is testified by a decree passed on the 25th of February 1567. But although the importance of the question was frequently recognised, no definite or decided step seems to have been taken to effect the contemplated reform until the time of Napoleon I. The evil had then reached a terribly aggravated form. Slaughter-houses abutted on many of the principal thoroughfares; the traffic was impeded by the constant arrival of foot-sore beasts, whose piteous cries pained the ear; and rivulets of blood were to be seen in the gutters of the public streets. The constant accumulation of putrid offal tainted the atmosphere, and the Seine was polluted by being used as a common receptacle for slaughter-house refuse. This condition of things could not be allowed to continue, and on the 9th of February 1810, a decree was passed authorising the construction of abattoirs in the outskirts of Paris, and appointing a Commission, to which was committed the consideration of the entire question.

The result of the appointment of this Commission was the construction of the five existing abattoirs, which were formally opened for business on the 15th of September 1818. The Montmartre abattoir occupies  $8\frac{1}{2}$  English acres;

arrangement of the abattoirs will be understood from the preceding plan of that of M<sup>én</sup>ilmontant.

The component parts of a French abattoir are—1. *Echaudoirs*, which is the name given by the Paris butcher to the particular division allotted to him for the purpose of knocking down his beasts; 2. *Bouveries et Bergeries*, the places set apart for the animals waiting to be slaughtered, where the animals, instead of being killed at once, after a long and distressing journey, when their blood is heated and their flesh inflamed, are allowed to cool and rest till the body is restored to its normal healthy condition; 3. *Fondeurs*, or boiling-down establishments; and, 4. *Triperies*, which are buildings set apart for the cleaning of the tripe of bullocks, and the fat, heads, and tripe of sheep and calves. Besides these, a Paris abattoir contains *Logements des agens*, *Magasins*, *Réservoirs*, *Voiries*, *Lieux d'aisance*, *Voûtes*, *Remises et écuries*, *Parcs aux Bœufs*, &c., and is provided with an abundant supply of water. All the abattoirs are under the control of the municipal authorities, and frequent inspections are made by persons regularly appointed for that purpose.

The abattoirs are situated within the barriers, each at a distance of about a mile and three-quarters from the heart of the city, in districts where human habitations are still comparatively few. There are two principal markets from which the abattoirs at Paris are supplied,—the one at Poissy, about 13 miles to the north-west, and the other at Sceaux, about 5 miles and a quarter to the south of the city. There are also two markets for cows and calves, namely, *La Chapelle* and *Les Bernadins*.

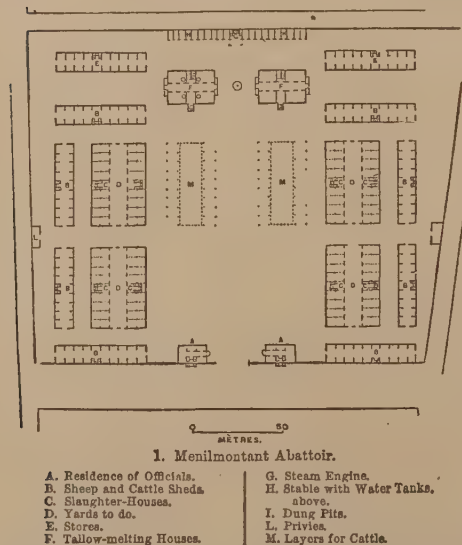
The Paris abattoirs were until recently the most perfect specimens of their class; and even now, although in some of their details they have been surpassed by the new Islington meat market, for their complete and compact arrangement they remain unrivalled.

The example set by Paris in this matter has been followed in a more or less modified form by most of the principal Continental towns, and the system of abattoirs has become almost universal in France.

The condition of London in this important sanitary respect was for a long period little more endurable than that of Paris before the adoption of its reformed system. Smithfield market, situated in a very populous neighbourhood, continued till 1852 to be an abomination to the town and a standing reproach to its authorities. No fewer than 243,537 cattle and 1,455,249 sheep were sold there in 1852, to be afterwards slaughtered in the crowded courts and thoroughfares of the metropolis. But public opinion at length forced the Legislature to interfere, and the corporation was compelled to abandon Smithfield market and to provide a substitute for it elsewhere.

The site selected was in the suburb of Islington, and the designs for the work were prepared by Mr Bunning. The first stone was laid March 24, 1854, and the market was opened by Prince Albert, June 15, 1855. The Islington market is undoubtedly the most perfect of its kind. It occupies a space of some 20 acres on the high land near the Pentonville prison, and is open to both native and foreign cattle, excepting beasts from foreign countries under quarantine.

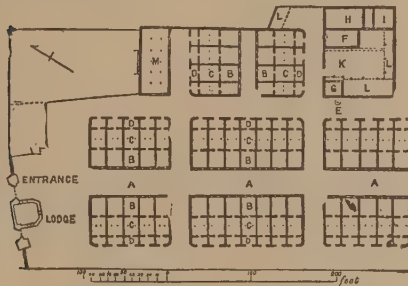
In connection with the Islington cattle market are a few slaughter-houses, half of which were originally public, and half rented to private individuals; but at present they are all practically private, and the majority of the cattle sold are driven away and killed at private slaughter-houses. In this respect the London system differs from that of Paris; and it may be said for the former that the meat is less liable to be spoiled by being carted to a distance, and is therefore probably delivered in better condition; but the latter secures that great desideratum, the practical extinction of isolated slaughter-houses.



M<sup>én</sup>ilmontant,  $10\frac{1}{2}$  acres; Grenelle,  $7\frac{1}{2}$ ; Du Roule,  $5\frac{1}{2}$ ; and Villejuif,  $5\frac{1}{4}$ . The first two contain each 64 slaughter-houses and the same number of cattle-sheds; the third, 48; and each of the others 32. The dimensions of each of the slaughter-houses is about  $29\frac{1}{2}$  feet by 13. The general



The Edinburgh abattoir, erected in 1851, by the corporation, from designs prepared by Mr David Cousin, the city architect, is the best as regards both construction and management in the United Kingdom. It occupies an area of four acres and a quarter, surrounded by a screen-wall, from which, along the greater part of its length, the buildings are separated by a considerable open space. Opposite



2. Edinburgh Slaughter-Houses.

- |                         |                                      |
|-------------------------|--------------------------------------|
| A. Central Roadway.     | G. Raised Water Tank.                |
| B. Slaughtering Booths. | H. Tripery.                          |
| C. Cattle Sheds.        | I. Pig-slaughtering House.           |
| D. Enclosed Yards.      | K. Court for Cattle.                 |
| E. Wall.                | L. Sheds.                            |
| F. Steam-engine.        | M. Blood House, now Albumen Factory. |

the principal gateway is a double row of buildings, extending in a straight line to about 376 feet in length, with a central roadway (marked AA in the annexed plan), 25 feet wide. There are three separate blocks of building on each side of the roadway, the central one being 140 feet in length; and the others 100 feet each—cross-roads 18 feet wide separating the blocks. These ranges of building, as well as two smaller blocks that are placed transversely behind the eastern central block, are divided into compartments, numbering 42 in all, and all arranged on the same plan. Next the roadway is the slaughtering-booth (BB), 18 feet by 24, and 20 feet in height, and behind this is a shed (CC) 18 feet by 22, where the cattle are kept before being slaughtered. All the cattle are driven into these sheds by a back-entrance, through the small enclosed yards (DD). The large doors of the booths are hung by balance weights, and slide up and down, so as to present no obstruction either within the booth or outside. By a series of large ventilators along the roof, and by other contrivances, the slaughtering-booths are thoroughly ventilated. Great precautions have been used to keep rats out of the buildings. To effect this, the booths are laid with thick well-dressed pavement, resting on a stratum of concrete 12 inches thick, and the walls, to the height of 7 feet, are formed of solid ashlar; the roadways, too, are laid with concrete, and causewayed with dressed whinstone pavement; and the drainage consists entirely of glazed earthenware tubes.

The ground on which the abattoir is built was previously connected with a distillery, and contains a well 100 feet deep (E), which, with the extensive system of tunnels attached to it, provides the establishment with an abundant supply of pure water. By means of a steam-engine (F), introduced in 1872, the water is pumped up into a raised tank (G), whence it is distributed to the different booths and sheds, as well as for scouring the roadways and drains. The steam from the engine is utilised in heating water for the numerous cast-iron tanks required in the operations of cleansing and dressing the tripery (H) and pig slaughtering-house (I). By an ingenious arrangement of rotary brushes driven by the steam-engine,—the invention of Mr. Rutherford, the superintendent,—the tripe is dressed in a superior manner, and at greatly less cost

than by the tedious and troublesome method of hand-cleaning.

By the Edinburgh Slaughter-Houses Act of 1850, the management is vested in the city authorities. Booths are let at a statutory rent of £8 each per annum, and, in addition to this, gate-dues are payable for every beast entering the establishment. The present rates for tenants of booths are 1½d. for an ox or cow, ¾d. for a calf or pig, and ¼d. for a sheep. Common booths are provided for butchers who are not tenants, on payment of double gate-dues. The city claims the blood, gut, and manure. The tripe and feet are dressed for the trade without extra charge.

The blood was formerly collected in large casks, and disposed of for manufacturing purposes. This necessitated the storage of it for several days, causing in warm weather a very offensive effluvia. It even happened at times, when there was little demand for the commodity, that the blood had to be sent down the drains. All nuisance is now avoided, and the amount received annually for the blood has risen from between £200 and £450 to from £800 to £1200, by a contract into which Messrs Smith and Forrest of Manchester have entered with the city authorities, to take over the whole blood at a fixed price per beast. They have erected extensive premises and apparatus at their own cost, for extracting from the blood the albumen, for which there is great demand in calico-printing, and for converting the clot into manure.

In connection with the establishment is a boiling-house, where all meat unfit for human food is boiled down and destroyed. The number of carcases seized by the inspector, and sent to the boiling-house, during the 5½ years ending with the close of 1872, amounted to 1449, giving a weight of upwards of 400,000 pounds.

Before the erection of these buildings, private slaughter-houses were scattered all over the city, often in the most populous districts, where, through want of drainage and imperfect ventilation, they contaminated the whole neighbourhood. Since the opening of the public abattoir, all private slaughtering, in the city or within a mile of it, is strictly prohibited.

Few of the provincial towns in Great Britain have as yet followed the example of London and Edinburgh. In some instances improvements on the old system have been adopted, but Great Britain is still not only far behind her foreign neighbours in respect of abattoirs, but has even been excelled by some of her own dependencies. In America abattoirs are numerous, and at Calcutta and other towns in British India, the meat markets present a very creditable appearance from their cleanliness and systematic arrangement. (C. N. R.)

ABAUZIT, FIRMIN, a learned Frenchman, was born of Protestant parents at Uzès, in Languedoc, in 1679. His father, who was of Arabian descent, died when he was but two years of age; and when, on the revocation of the Edict of Nantes in 1685, the authorities took steps to have him educated in the Roman Catholic faith, his mother contrived his escape. For two years his brother and he lived as fugitives in the mountains of the Cevennes, but they at last reached Geneva, where their mother afterwards joined them on escaping from the imprisonment in which she was held from the time of their flight. Abauzit's youth was spent in diligent study, and at an early age he acquired great proficiency in languages, physics, and theology. In 1698 he travelled into Holland, and there became acquainted with Bayle, Jurien, and Bausage. Proceeding to England, he was introduced to Sir Isaac Newton, who found in him one of the earliest defenders of the great truths his discoveries disclosed to the world.

Sir Isaac corrected in the second edition of his *Principia* an error pointed out by Abauzit. The high estimate Newton entertained of his merits appears from the compliment he paid to Abauzit, when, sending him the *Commercium Epistolicum*, he said, "You are well worthy to judge between Leibnitz and me." The reputation of Abauzit induced William III. to request him to settle in England, but he did not accept the king's offer, preferring to return to Geneva. There from 1715 he rendered valuable assistance to a society that had been formed for translating the New Testament into French. He declined the offer of the chair of philosophy in the University in 1723, but accepted, in 1727, the sinecure office of librarian to the city of his adoption. Here he died at a good old age, in 1767. Abauzit was a man of great learning and of wonderful versatility. The varied knowledge he possessed was so well digested and arranged in his retentive mind as to be always within his reach for immediate use. Whatever chance was to be discussed, it used to be said of Abauzit, as of Professor Whewell of our own times, that he seemed to have made it a subject of particular study. Rousseau, who was jealously sparing of his praises, addressed to him, in his *Nouvelle Héloïse*, a fine panegyric; and when a stranger flatteringly told Voltaire he had come to see a great man, the philosopher asked him if he had seen Abauzit. Little remains of the labours of this intellectual giant, his heirs having, it is said, destroyed the papers that came into their possession, because their religious opinions differed from those of Abauzit. A few theological, archæological, and astronomical articles from his pen appeared in the *Journal Helvétique* and elsewhere, and he contributed several papers to Rousseau's *Dictionary of Music*. A work he wrote throwing doubt on the canonical authority of the Apocalypse was answered—conclusively, as Abauzit himself allowed—by Dr Leonard Twells. He edited, and made valuable additions to Spon's *History of Geneva*. A collection of his writings was published at Geneva in 1770, and another at London in 1773. Some of them were translated into English by Dr Harwood (1770, 1774). Information regarding Abauzit will be found in Senebier's *Histoire Littéraire de Genève*, Harwood's *Miscellanies*, and Orme's *Bibliotheca Biblica*, 1834.

ABB, a town of Yemen in Arabia, situated on a mountain in the midst of a very fertile country, 73 miles N.E. of Mocha. Lat. 13° 58' N., long. 44° 15' E. It contains about 800 houses, and is surrounded by a strong wall; the streets are well paved; and an aqueduct from a neighbouring mountain supplies it with water, which is received in a reservoir in front of the principal mosque. The population is about 5000.

ABBADIE, JAMES, an eminent Protestant divine, was born at Nay in Bern about 1657. His parents were poor, but through the kindness of discerning friends, he received an excellent education. He prosecuted his studies with such success, that on completing his course at Sedan, though only seventeen years of age, he had conferred on him the degree of doctor in theology. After spending some years in Berlin as minister of a French Protestant church, he accompanied Marshal Schomberg, in 1688, to England, and became minister of the French church in the Savoy, London. His strong attachment to the cause of King William appears in his elaborate defence of the Revolution, as well as in his history of the conspiracy of 1696, the materials of which were furnished, it is said, by the secretaries of state. The king promoted him to the deanery of Killaloe in Ireland. He died in London in 1727. Abbadie was a man of great ability and an eloquent preacher, but is best known by his religious treatises, several of which were translated from the original French into other languages, and had a

wide circulation all over Europe. The most important of these are *Traité de la Vérité de la Religion Chrétienne*; its continuation, *Traité de la Divinité de Jésus-Christ*; and *L'Art de se connaître Soi-même*.

ABBAS I., surnamed THE GREAT, one of the most celebrated of the sovereigns of Persia, was the youngest son of Shah Mohammed Khodabendoh. After heading a successful rebellion against his father, and causing one of his brothers (or, as some say, both) to be assassinated, he obtained possession of the throne at the early age of eighteen (1585). Determined to raise the fallen fortunes of his country, he first directed his efforts against the predatory Uzbeks, who occupied and harassed Khorasan. After a long and severe struggle, he defeated them in a great battle near Herat (1597), and drove them out of his dominions. In the wars he carried on with the Turks during nearly the whole of his reign, his successes were numerous, and he acquired or regained a large extent of territory. By the victory he gained at Bassorah (1605), he extended his empire beyond the Euphrates; Achmed I. was forced to cede Shirwan and Kurdistan in 1611; the united armies of the Turks and Tartars were completely defeated near Sultanieh in 1618, and Abbas made peace on very favourable terms; and on the Turks renewing the war, Baghdad fell into his hands after a year's siege (1623). In the same year he took the island of Ormuz from the Portuguese, by the assistance of the British. When he died in 1628, his dominions reached from the Tigris to the Indus. Abbas distinguished himself, not only by his successes in arms, and by the magnificence of his court, but also by his reforms in the administration of his kingdom. He encouraged commerce, and, by constructing highways and building bridges, did much to facilitate it. To foreigners, especially Christians, he showed a spirit of tolerance; two Englishmen, Sir Anthony and Sir Robert Shirley, were admitted to his confidence, and seem to have had much influence over him. His fame is tarnished, however, by numerous deeds of tyranny and cruelty. His own family, especially, suffered from his fits of jealousy; his eldest son was slain, and the eyes of his other children were put out, by his orders.

ABBAS MIRZA (b. 1785, d. 1833), Prince of Persia, third son of the Shah Feth Ali, was destined by his father to succeed him in the government, because of his mother's connection with the royal tribe of the Khadjars. He led various expeditions against the Russians, but generally without success (1803, 1813, 1826). By a treaty made between Russia and Persia in 1828, the right of Abbas to the succession was recognised. When the Russian deputies were murdered by the Persian populace in 1829, Abbas was sent to St Petersburg, where he received a hearty welcome from the Czar, and made himself a favourite by his courtesy and literary taste. He formed a design against Herat, but died shortly after the siege had been opened by his son, who succeeded Feth Ali as the Shah Mohammed Mirza. He was truthful—a rare quality in an Eastern—plain in dress and style of living, and fond of literature.

ABBASSIDES, the caliphs of Baghdad, the most famous dynasty of the sovereigns of the Mahometan or Saracen empire. They derived their name and descent from Abbas (b. 566, d. 652 A.D.), the uncle and adviser of Mahomet, and succeeded the dynasty of the Ommiads, the caliphs of Damascus. Early in the 8th century the family of Abbas had acquired great influence from their near relationship to the Prophet; and Ibrahim, the fourth in descent from Abbas, supported by the province of Khorasan, obtained several successes over the Ommiad armies, but was captured and put to death by the Caliph Merwan (747). Ibrahim's brother, Abul-Abbas, whom he



had named his heir, assumed the title of caliph, and, by a decisive victory near the river Zab (750), effected the overthrow of the Omniad dynasty. Merwan fled to Egypt, but was pursued and put to death, and the vanquished family was treated with a severity which gained for Abul-Abbas the surname of 'Al-Saffah, the Blood-shedder. From this time the house of Abbas was fully established in the government, but the Spanish provinces were lost to the empire by the erection of an independent caliphate of Cordova, under Abderrahman.

On the death of Abul-Abbas, Almansur succeeded to the throne, and founded Baghdad as the seat of empire. He and his son Mohdi waged war successfully against the Turkomans and Greeks of Asia Minor; but from this time the rule of the Abbassides is marked rather by the development of the liberal arts than by extension of territory. The strictness of the Mohammedan religion was relaxed, and the faithful yielded to the seductions of luxury. The caliphs Harun Al-Rashid (786-809) and Al-Mamun (813-833) attained a world-wide celebrity by their gorgeous palaces, their vast treasures, and their brilliant and numerous equipages, in all which their splendour contrasted strikingly with the poverty of European sovereigns. The former is known as one of the heroes of the *Arabian Nights*; the latter more worthily still as a liberal patron of literature and science. It is a mistake, however, to look in the rule of these caliphs for the lenity of modern civilisation. "No Christian government," says Hallam, "except perhaps that of Constantinople, exhibits such a series of tyrants as the caliphs of Baghdad, if deeds of blood, wrought through unbridled passion or jealous policy, may challenge the name of tyranny."

The territory of the Abbassides soon suffered dismemberment, and their power began to decay. Rival sovereignties (Ashlabites, Edrisites, &c.) arose in Africa, and an independent government was constituted in Khorasan (820), under the Taherites. In the West, again, the Greeks encroached upon the possessions of the Saracens in Asia Minor. Ruin, however, came from a less civilised race. The caliphs had continually been waging war with the Tartar hordes of Turkestan, and many captives taken in these wars were dispersed throughout the empire. Attracted by their bravery and fearing rebellion among his subjects, Motassem (833-842), the founder of Samarah, and successful opponent of the Grecian forces under Theophilus, formed bodyguards of the Turkish prisoners, who became from that time the real governors of the Saracen empire. Motawakel, son of Motassem, was assassinated by them in the palace (861); and succeeding caliphs became mere puppets in their hands. Radhi (934-941) was compelled by the disorganised condition of his kingdom to delegate to Mohammed ben Rayek (936 A.D.), under the title of *Emir al-Omara*, commander of the commanders, the government of the army and the other functions of the caliphate. Province after province proclaimed itself independent; the caliph's rule became narrowed to Baghdad and its vicinity; and the house of Abbas lost its power in the East for ever, when Hulagu, prince of the Mongols, set Baghdad on fire, and slew Motassem, the reigning caliph (20th Feb. 1258). The Abbassides continued to hold a semblance of power in the merely nominal caliphate of Egypt, and feebly attempted to recover their ancient seat. The last of them, Motawakel III., was taken by Sultan Selim I., the conqueror of Egypt, to Constantinople, and detained there for some time as a prisoner. He afterwards returned to Egypt, and died at Cairo a pensionary of the Ottoman government, in 1538.

ABBÉ is the French word corresponding to ABBOT, but, from the middle of the sixteenth century to the time of the French Revolution, the term had a wider application.

The assumption by a numerous class of the name and style of abbé appears to have originated in the right conceded to the King of France, by a concordat between Pope Leo X. and Francis I., to appoint *abbés commendataires* to 225 abbeys, that is, to most of the abbeys in France. This kind of appointment, whereby the living was *commended* to some one till a proper election could take place, though ostensibly provisional, really put the nominee in full and permanent possession of the benefice. He received about one-third of the revenues of the abbey, but had no share in its government, the charge of the house being intrusted to a resident officer, the *prieur claustral*. The *abbés commendataires* were not necessarily priests; the papal bull required indeed that they should take orders within a stated time after their appointment, but there seems to have been no difficulty in procuring relief from that obligation. The expectation of obtaining these sinecures drew young men towards the Church in considerable numbers, and the class of abbés so formed—*abbés de cour* they were sometimes called, and sometimes (ironically) *abbés de sainte espérance*, abbés of St Hope—came to hold a recognised position, that, perhaps proved as great an attraction as the hope of preferment. The connection many of them had with the Church was of the slenderest kind, consisting mainly in adopting the name of abbé, after a remarkably moderate course of theological study; practising celibacy; and wearing a distinctive dress—a short dark-violet coat with narrow collar. Being men of presumed learning and undoubted leisure, many of the class found admission to the houses of the French nobility as tutors or advisers. Nearly every great family had its abbé. As might be imagined from the objectless sort of life the class led, many of the abbés were of indifferent character; but there are not a few instances of abbés attaining eminence, both in political life and in the walks of literature and science. The Abbé Sieyès may be taken as a prominent example of the latter type.

ABBEOKUTA, or ABEOKUTA, a town of West Africa in the Yoruba Country, situated in N. lat. 7° 8', and E. long. 3° 25', on the Ogun River, about 50 miles north of Lagos, in a direct line, or 81 miles by water. It lies in a beautiful and fertile country, the surface of which is broken by masses of grey granite. Like most African towns, Abbeokuta is spread over an extensive area, being surrounded by mud walls, 18 miles in extent. The houses are also of mud, and the streets mostly narrow and filthy. There are numerous markets in which native products and articles of European manufacture are exposed for sale. Palm-oil and shea-butter are the chief articles of export, and it is expected that the cotton of the country will become a valuable article of commerce. The slave trade and human sacrifices have been abolished; but notwithstanding the efforts of English and American missionaries, the natives are still idle and degraded. The state called Egbaland, of which Abbeokuta is the capital, has an area of about 3000 square miles. Its progress has been much hindered by frequent wars with the king of Dahomey. Population of the town, about 150,000; of the state or adjacent territory, 50,000. (See Burton's *Abbeokuta and the Cameroon Mountains*, 2 vols.)

ABBESS, the female superior of an abbey or convent of nuns. The mode of election, position, rights, and authority of an abbess, correspond generally with those of an abbot. The office was elective, the choice being by the secret votes of the sisters from their own body. The abbess was solemnly admitted to her office by episcopal benediction, together with the conferring of a staff and pectoral, and held it for life, though liable to be deprived for misconduct. The Council of Trent fixes the qualifying age at forty, with eight years of profession. Abbesses had

a right to demand absolute obedience of their nuns, over whom they exercised discipline, extending even to the power of expulsion, subject, however, to the bishop. As a female an abess was incapable of performing the spiritual functions of the priesthood belonging to an abbot. She could not ordain, confer the veil, nor excommunicate. In the eighth century abbesses were censured for usurping priestly powers by presuming to give the veil to virgins, and to confer benediction and imposition of hands on men. In England they attended ecclesiastical councils, e.g. that of Beacanfield in 694, where they signed before the presbyters.

By Celtic usage abbesses presided over joint-houses of monks and nuns. This custom accompanied Celtic monastic missions to France and Spain, and even to Rome itself. At a later period, A.D. 1115, Robert, the founder of Fontevraud, committed the government of the whole order, men as well as women, to a female superior.

Martene asserts that abbesses formerly confessed nuns, but that their undue inquisitiveness rendered it necessary to forbid the practice.

The dress of an English abbess of the 12th century consisted of a long white tunic with close sleeves, and a black overcoat as long as the tunic, with large and loose sleeves, the hood covering the head completely. The abbesses of the 14th and 15th centuries had adopted secular habits, and there was little to distinguish them from their lay sisters. (E. V.)

ABBEVILLE, a city of France, in the department of the Somme, is situated on the River Somme, 12 miles from its mouth in the English Channel, and 25 miles N.W. of Amiens. It lies in a pleasant and fertile valley, and is built partly on an island, and partly on both sides of the river. The streets are narrow, and the houses are mostly picturesque old structures, built of wood, with many quaint decaying gables and dark archways. The town is strongly fortified on Vauban's system. It has a tribunal and chamber of commerce. The most remarkable edifice is the Church of St Wolfran, which was erected in the time of Louis XII. Although the original design was not completed, enough was built to give a good idea of the splendid structure it was intended to erect. The façade is a magnificent specimen of the flamboyant Gothic style, and is adorned by rich tracery, while the western front is flanked by two Gothic towers. A cloth manufactory was established here by Van Robais, a Dutchman, under the patronage of the minister Colbert, as early as 1669; and since that time Abbeville has continued to be one of the most thriving manufacturing towns in France. Besides black cloths of the best quality, there are produced velvets, cottons, linens, serges, sackings, hosiery, pack-thread, jewellery, soap, and glass-ware. It has also establishments for spinning wool, print-works, bleaching-works, tanneries, a paper manufactory, &c.; and being situated in the centre of a populous district, it has a considerable trade with the surrounding country. Vessels of from 200 to 390 tons come up to the town at high-water. Abbeville is a station on the Northern Railway, and is also connected with Paris and Belgium by canals. Fossil remains of gigantic mammalia now extinct, as well as the rude flint weapons of pre-historic man, have been discovered in the geological deposits of the neighbourhood. A treaty was concluded here in 1259 between Henry III. of England and Louis IX. of France, by which the province of Guienne was ceded to the English. Population, 20,058.

ABBEY, a monastery, or conventual establishment, under the government of an ABBOT or an ABBESS. A priory only differed from an abbey in that the superior bore the name of prior instead of abbot. This was the

case in all the English conventual cathedrals, e.g., Canterbury, Ely, Norwich, &c., where the archbishop or bishop occupied the abbot's place, the superior of the monastery being termed prior. Other priories were originally offshoots from the larger abbeys, to the abbots of which they continued subordinate; but in later times the actual distinction between abbeys and priories was lost.

Reserving for the article MONASTICISM the history of the rise and progress of the monastic system, its objects, benefits, evils, its decline and fall, we propose in this article to confine ourselves to the structural plan and arrangement of conventual establishments, and a description of the various buildings of which these vast piles were composed.

The earliest Christian monastic communities with which Cells we are acquainted consisted of groups of cells or huts collected about a common centre, which was usually the abode of some anchorite celebrated for superior holiness or singular asceticism, but without any attempt at orderly arrangement. The formation of such communities in the East does not date from the introduction of Christianity. The example had been already set by the Essenes in Judea; and the Therapeutæ in Egypt, who may be considered the prototypes of the industrial and meditative communities of monks.

In the earliest age of Christian monasticism the ascetics were accustomed to live singly, independent of one another, at no great distance from some village, supporting themselves by the labour of their own hands, and distributing the surplus after the supply of their own scanty wants to the poor. Increasing religious fervour, aided by persecution, drove them further and further away from the abodes of men into mountain solitudes or lonely deserts. The deserts of Egypt swarmed with the cells or huts of these anchorites. Antony, who had retired to the Egyptian Thebaid during the persecution of Maximin, A.D. 312, was the most celebrated among them for his austerities, his sanctity, and his power as an exorcist. His fame collected round him a host of followers, emulous of his sanctity. The deeper he withdrew into the wilderness, the more numerous his disciples became. They refused to be separated from him, and built their cells round that of their spiritual father. Thus arose the first monastic community, consisting of anchorites living each in his own little dwelling, united together under one superior. Antony, as Neander remarks (*Church History*, vol. iii. p. 316, Clark's Trans.), "without any conscious design of his own, had become the founder of a new mode of living in common, Cœnobitism." By degrees order was introduced in the groups of huts. They were arranged in lines like the tents in an encampment, or the houses in a street. From this arrangement these lines of single cells came to be known as *Lauræ*, *Ααῖραι*, "streets" or "lanes."

The real founder of cœnobia or monasteries in the modern Cœnobia sense was Pachomius, an Egyptian of the beginning of the 4th century. The first community established by him was at Tabennæ, an island of the Nile in Upper Egypt. Eight others were founded in his lifetime, numbering 3000 monks. Within 50 years from his death his societies could reckon 50,000 members. These cœnobia resembled villages, peopled by a hard-working religious community, all of one sex. The buildings were detached, small, and of the humblest character. Each cell or hut, according to Sozomen (H. E. iii. 14), contained three monks. They took their chief meal in a common refectory at 3 P.M., up to which hour they usually fasted. They ate in silence, with hoods so drawn over their faces that they could see nothing but what was on the table before them. The monks spent all the time, not devoted to religious services or study, in manual labour. Palladius, who visited the Egyptian monasteries about the close of the 4th century, found among the 300

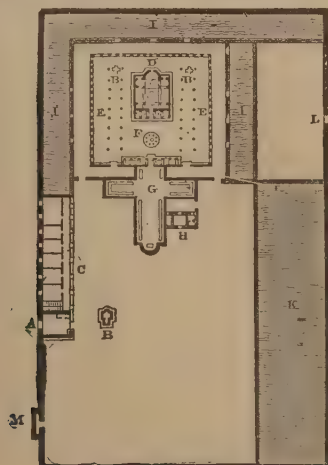


members of the *Cœnobium* of Panopolis, under the Pachomian rule, 15 tailors, 7 smiths, 4 carpenters, 12 camel-drivers, and 15 tanners. Each separate community had its own *œconomus*, or steward, who was subject to a chief *œconomus* stationed at the head establishment. All the produce of the monks' labour was committed to him, and by him shipped to Alexandria. The money raised by the sale was expended in the purchase of stores for the support of the communities, and what was over was devoted to charity. Twice in the year the superiors of the several *cœnobia* met at the chief monastery, under the presidency of an Archimandrite ("the chief of the fold," from *μῆδρα*, a fold), and at the last meeting gave in reports of their administration for the year.

The *cœnobia* of Syria belonged to the Pachomian institution. We learn many details concerning those in the vicinity of Antioch from Chrysostom's writings. The monks lived in separate huts, *καλύβαι*, forming a religious hamlet on the mountain side. They were subject to an abbot, and observed a common rule. (They had no refectory, but ate their common meal, of bread and water only, when the day's labour was over, reclining on strewn grass, sometimes out of doors.) Four times in the day they joined in prayers and psalms.

The necessity for defence from hostile attacks, economy of space, and convenience of access from one part of the community to another, by degrees dictated a more compact and orderly arrangement of the buildings of a monastic *cœnobium*. Large piles of building were erected, with strong outside walls, capable of resisting the assaults of an enemy, within which all the necessary edifices were ranged round one or more open courts, usually surrounded with cloisters. The usual Eastern arrangement is exemplified in the plan of the convent of Santa Laura, Mt. Athos (Laura, the designation of a monastery generally, being converted into a female saint).

Santa  
Laura,  
Mt. Athos



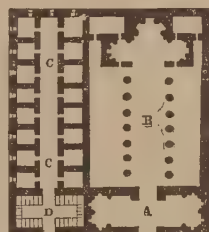
Monastery of Santa Laura, Mount Athos (Lenoir):

This monastery, like the Oriental monasteries generally is surrounded by a strong and lofty blank stone wall, enclosing an area of between 3 and 4 acres. The longer side extends to a length of about 500 feet. There is only one main entrance, on the north side (A), defended by three separate iron doors. Near the entrance is a large tower (M), a constant feature in the monasteries of the Levant. There is a small postern gate at (L). The

enclosure comprises two large open courts, surrounded with buildings connected with cloister galleries of wood or stone. The outer court, which is much the larger, contains the granaries and storehouses (K), and the kitchen (H), and other offices connected with the refectory (G). Immediately adjacent to the gateway is a two-storeyed guest-house, opening from a cloister (C). The inner court is surrounded by a cloister (EE), from which open the monks' cells (II). In the centre of this court stands the catholicon or conventual church, a square building with an apse of the cruciform domical Byzantine type, approached by a domed narthex. In front of the church stands a marble fountain (F), covered by a dome supported on columns. Opening from the western side of the cloister, but actually standing in the outer court, is the refectory (G), a large cruciform building, about 100 feet each way, decorated within with frescoes of saints. At the upper end is a semi-circular recess, recalling the Triclinium of the Lateran Palace at Rome, in which is placed the seat of the *Hegumenos* or abbot. This apartment is chiefly used as a hall of meeting, the Oriental monks usually taking their meals in their separate cells. St Laura is exceeded in magnitude by the Convent of Vatopede, also on Mount Athos. This enormous establishment covers at least 4 acres of ground, and contains so many separate buildings within its massive walls that it resembles a fortified town. It lodges above 300 monks, and the establishment of the *Hegumenos* is described as resembling the court of a petty sovereign prince. The immense refectory, of the same cruciform shape as that of St Laura, will accommodate 500 guests at its 24 marble tables.

Vatopede

The annexed plan of a Coptic monastery, from Lenoir shows us a church of three aisles, with cellular apses, and two ranges of cells on either side of an oblong gallery.



Plan of Coptic Monastery.

- A. Narthex.
- B. Church.
- C. Corridor, with cells on each side.
- D. Staircase.

Monasticism in the West owes its extension and development to Benedict of Nursia (born A.D. 480). His rule was diffused with miraculous rapidity from the parent foundation on Monte Cassino through the whole of Western Europe, and every country witnessed the erection of monasteries far exceeding anything that had yet been seen in spaciousness and splendour. Few great towns in Italy were without their Benedictine convent, and they quickly rose in all the great centres of population in England, France, and Spain. The number of these monasteries founded between A.D. 580 and 700 is amazing. Before the Council of Constance, A.D. 1415, no fewer than 15,070 abbeys had been established of this order alone. The Benedictine rule, spreading with the vigour of a young and powerful life, absorbed into itself the older monastic foundations, whose discipline had too usually become disgracefully relaxed. In the words of Milman (*Latin Christianity*, vol. i. p. 425, note x.), "The Benedictine rule was universally received, even in the older monasteries of Gaul, Britain, Spain, and throughout the West, not as that of a rival order (all rivalry was of later date), but as a more full and perfect rule of the monastic life." Not only, therefore, were new monasteries founded, but those already existing were pulled down, and rebuilt to adapt them to the requirements of the new rule.

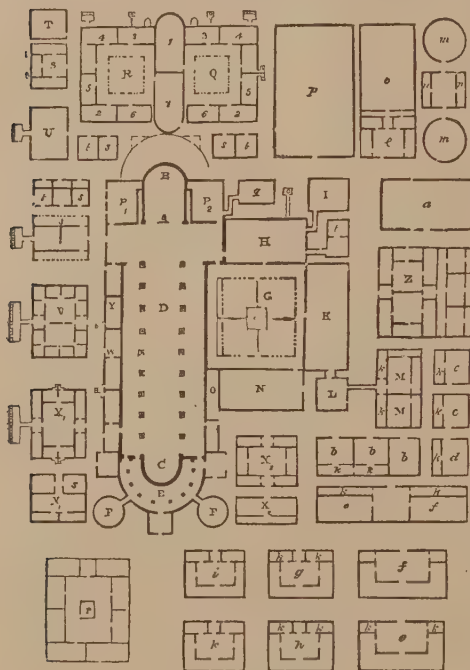
The buildings of a Benedictine abbey were uniformly arranged after one plan, modified where necessary (as at

Durham and Worcester, where the monasteries stand close to the steep bank of a river), to accommodate the arrangement to local circumstances.

We have no existing examples of the earlier monasteries of the Benedictine order. They have all yielded to the ravages of time and the violence of man. But we have fortunately preserved to us an elaborate plan of the great Swiss monastery of St Gall, erected about A.D. 820, which puts us in possession of the whole arrangements of a monastery of the first class towards the early part of the 9th century. This curious and interesting plan has been made the subject of a memoir both by Keller (Zurich, 1844) and by Professor Willis (*Arch. Journal*, 1848, vol. v. pp. 86-117). To the latter we are indebted for the

the original preserved in the archives of the convent. The general appearance of the convent is that of a town of isolated houses with streets running between them. It is evidently planned in compliance with the Benedictine rule, which enjoined that, if possible, the monastery should contain within itself every necessary of life, as well as the buildings more intimately connected with the religious and social life of its inmates. It should comprise a mill, a bakehouse, stables and cow-houses, together with accommodation for carrying on all necessary mechanical arts within the walls, so as to obviate the necessity of the monks going outside its limits. The general distribution of the buildings may be thus described:—The church, with its cloister to the south, occupies the centre of a quadrangular area, about 430 feet square. The buildings, as in all great monasteries, are distributed into groups. The church forms the nucleus, as the centre of the religious life of the community. In closest connection with the church is the group of buildings appropriated to the monastic life and its daily requirements—the refectory for eating, the dormitory for sleeping, the common room for social intercourse, the chapter-house for religious and disciplinary conference. These essential elements of monastic life are ranged about a cloister court, surrounded by a covered arcade, affording communication sheltered from the elements, between the various buildings. The infirmary for sick monks, with the physician's house and physic garden, lies to the east. In the same group with the infirmary is the school for the novices. The outer school, with its head-master's house against the opposite wall of the church, stands outside the convent enclosure, in close proximity to the abbot's house, that he might have a constant eye over them. The buildings devoted to hospitality are divided into three groups,—one for the reception of distinguished guests, another for monks visiting the monastery, a third for poor travellers and pilgrims. The first and third are placed to the right and left of the common entrance of the monastery,—the hospitiary for distinguished guests being placed on the north side of the church, not far from the abbot's house; that for the poor on the south side next to the farm buildings. The monks are lodged in a guest-house built against the north wall of the church. The group of buildings connected with the material wants of the establishment is placed to the south and west of the church, and is distinctly separated from the monastic buildings. The kitchen, buttry, and offices, are reached by a passage from the west end of the refectory, and are connected with the bakehouse and brewhouse, which are placed still further away. The whole of the southern and western sides is devoted to workshops, stables, and farm-buildings. The buildings, with some exceptions, seem to have been of one story only, and all but the church were probably erected of wood. The whole includes thirty-three separate blocks. The church (D) is cruciform, with a nave of nine bays, and a semicircular apse at either extremity. That to the west is surrounded by a semicircular colonnade, leaving an open "Paradise" (E) between it and the wall of the church. The whole area is divided by screens into various chapels. The high altar (A) stands immediately to the east of the transept, or ritual choir; the altar of St Paul (B) in the eastern, and that of St Peter (C) in the western apse. A cylindrical campanile stands detached from the church on either side of the western apse (FF).

The "cloister court" (G) on the south side of the nave of the church has on its east side the "pisalis" or "calefactory" (H), the common sitting-room of the brethren, warmed by fires beneath the floor. On this side in later monasteries we invariably find the chapter-house, the absence of which in this plan is somewhat surprising. It appears, however from the inscriptions on the plan itself, that the



Ground-plan of St Gall.

- CHURCH.**  
 A. High Altar.  
 B. Altar of St Paul.  
 C. Altar of St Peter.  
 D. Nave.  
 E. Paradise.  
 F. Towers.  
 FF. Towers.
- MONASTIC BUILDINGS.**  
 G. Cloister.  
 H. Calefactory, with Dormitory over.  
 I. Necessary.  
 J. Abbot's house.  
 K. Refectory.  
 L. Kitchen.  
 M. Bakehouse and Brewhouse.  
 N. Cellar.  
 O. Parlour.  
 P. Scriptorium, with Library over.  
 Q. Sacristy and Vestry.  
 R. House of Novices—1. Chapel; 2. Refectory; 3. Calefactory; 4. Dormitory; 5. Master's Room; 6. Chambers.  
 S. Infirmary—1-6 as above in the House of Novices.  
 T. Doctor's House.  
 U. Physic Garden.
- U. House for blood-letting.**  
 V. School.  
 W. Schoolmaster's Lodgings.  
 X<sub>1</sub>X<sub>2</sub>. Guest-house for those of superior rank.  
 X<sub>3</sub>X<sub>4</sub>. Guest-house for the poor.  
 Y. Guest-chamber for strange monks.
- MANIAL DEPARTMENT.**  
 Z. Factory.  
 a. Threshing-floor.  
 b. Workshops.  
 c. e. Mills.  
 d. Kiln.  
 e. Stables.  
 f. Cowsheds.  
 g. Goatsheds.  
 h. Pig-sties, 4. Sheep-folds.  
 i. k. Serrants' and workmen's sleeping chambers.  
 l. Gardener's house.  
 m. n. Hen and Duck house.  
 o. Poultry-keeper's house.  
 p. Cemetery.  
 q. Bakehouse for Sacramental Bread.  
 r. Unnamed in Plan.  
 s. s. s. Kitchen.  
 t. t. t. Bath.

substance of the following description, as well as for the above woodcut, reduced from his elucidated transcript of



north walk of the cloisters served for the purposes of a chapter-house, and was fitted up with benches on the long sides. Above the calefactory is the "dormitory" opening into the south transept of the church, to enable the monks to attend the nocturnal services with readiness. A passage at the other end leads to the "necessarium" (I), a portion of the monastic buildings always planned with extreme care. The southern side is occupied by the "refectory" (K), from the west end of which by a vestibule the kitchen (L) is reached. This is separated from the main buildings of the monastery, and is connected by a long passage with a building containing the bakehouse and brewhouse (M), and the sleeping-rooms of the servants. The upper story of the refectory is the "vestiary," where the ordinary clothes of the brethren were kept. On the western side of the cloister is another two story building (N). The cellar is below, and the larder and store-room above. Between this building and the church, opening by one door into the cloisters, and by another to the outer part of the monastery area, is the "parlour" for interviews with visitors from the external world (O). On the eastern side of the north transept is the "scriptorium" or writing-room (P), with the library above.

To the east of the church stands a group of buildings comprising two miniature conventual establishments, each complete in itself. Each has a covered cloister surrounded by the usual buildings, i.e., refectory, dormitory, &c., and a church or chapel on one side, placed back to back. A detached building belonging to each contains a bath and a kitchen. One of these diminutive convents is appropriated to the "oblats" or novices (Q), the other to the sick monks as an "infirmary" (R).

The "residence of the physicians" (S) stands contiguous to the infirmary, and the physic garden (T) at the north-east corner of the monastery. Besides other rooms, it contains a drug store, and a chamber for those who are dangerously ill. The "house for blood-letting and purging" adjoins it on the west (U).

The "outer school," to the north of the convent area, contains a large school-room divided across the middle by a screen or partition, and surrounded by fourteen little rooms, termed the dwellings of the scholars. The head-master's house (W) is opposite, built against the side wall of the church. The two "hospitia" or "guest-houses" for the entertainment of strangers of different degrees ( $X_1$   $X_2$ ) comprise a large common chamber or refectory in the centre, surrounded by sleeping apartments. Each is provided with its own brewhouse and bakehouse, and that for travellers of a superior order has a kitchen and store-room, with bed-rooms for their servants, and stables for their horses. There is also an "hospitium" for strange monks, abutting on the north wall of the church (Y).

Beyond the cloister, at the extreme verge of the convent area to the south, stands the "factory" (Z), containing workshops for shoemakers, saddlers (or shoemakers, *sellarii*), cutlers and grinders, trencher-makers, tanners, curriers, fullers, smiths, and goldsmiths, with their dwellings in the rear. On this side we also find the farm-buildings, the large granary and threshing-floor (*a*), mills (*c*), malt-house (*d*). Facing the west are the stables (*e*), ox-sheds (*f*), goat-stables (*g*), piggeries (*h*), sheep-folds (*i*), together with the servants' and labourers' quarters (*k*). At the south-east corner we find the hen and duck house, and poultry-yard (*m*), and the dwelling of the keeper (*n*). Hard by is the kitchen garden (*o*), the beds bearing the names of the vegetables growing in them, onions, garlic, celery, lettuces, poppy, carrots, cabbages, &c., eighteen in all. In the same way the physic garden presents the names of the medicinal herbs, and the cemetery (*p*) those of the trees, apple, pear, plum, quince, &c., planted there.

It is evident, from this most curious and valuable docu-

ment, that by the 9th century monastic establishments had become wealthy, and had acquired considerable importance, and were occupying a leading place in education, agriculture, and the industrial arts. The influence such an institution would diffuse through a wide district would be no less beneficial than powerful.

The curious bird's eye view of Canterbury Cathedral and Canterbury's annexed conventual buildings, taken about 1165, preserved in the Great Psalter in the library of Trinity College, Cambridge, as elucidated by Professor Willis with such admirable skill and accurate acquaintance with the existing remains,<sup>1</sup> exhibits the plan of a great Benedictine monastery in the 12th century, and enables us to compare it with that of the 9th, as seen at St Gall. We see in both the same general principles of arrangement, which indeed belong to all Benedictine monasteries, enabling us to determine with precision the disposition of the various buildings, when little more than fragments of the walls exist. From some local reasons, however, the cloister and monastic buildings are placed on the north, instead, as is far more commonly the case, on the south of the church. There is also a separate chapter-house, which is wanting at St Gall.

The buildings at Canterbury, as at St Gall, form separate groups. The church forms the nucleus. In immediate contact with this, on the north side, lie the cloister and the group of buildings devoted to the monastic life. Outside of these, to the west and east, are the "halls and chambers devoted to the exercise of hospitality, with which every monastery was provided, for the purpose of receiving as guests persons who visited it, whether clergy or laity, travellers, pilgrims, or paupers." To the north a large open court divides the monastic from the menial buildings, intentionally placed as remote as possible from the conventual buildings proper, the stables, granaries, barn, bakehouse, brewhouse, laundries, &c., inhabited by the lay servants of the establishment. At the greatest possible distance from the church, beyond the precinct of the convent, is the eleemosynary department. The *almshouse* for the relief of the poor, with a great hall annexed, forms the pauper's hospitium.

The most important group of buildings is naturally that devoted to monastic life. This includes two cloisters, the great cloister surrounded by the buildings essentially connected with the daily life of the monks,—the church to the south, the refectory or frater-house here as always on the side opposite to the church, and furthest removed from it, that no sound or smell of eating might penetrate its sacred precincts, to the east the dormitory, raised on a vaulted undercroft, and the chapter-house adjacent, and the lodgings of the cellarer to the west. To this officer was committed the provision of the monks' daily food, as well as that of the guests. He was, therefore, appropriately lodged in the immediate vicinity of the refectory and kitchen, and close to the guest-hall. A passage under the dormitory leads eastwards to the smaller or infirmary cloister, appropriated to the sick and infirm monks. Eastward of this cloister extend the hall and chapel of the infirmary, resembling in form and arrangement the nave and chancel of an aisled church. Beneath the dormitory, looking out into the green court or herbarium, lies the "pisalis" or "calefactory," the common room of the monks. At its north-east corner access was given from the dormitory to the *necessarium*, a portentous edifice in the form of a Norman hall, 145 feet long by 25 broad, containing fifty-five seats. It was, in common with all such offices in ancient monasteries, constructed with the most careful regard to cleanliness and

<sup>1</sup> *The Architectural History of the Conventual Buildings of the Monastery of Christ Church in Canterbury.* By the Rev. Robert Willis. Printed for the Kent Archaeological Society, 1869.

health, a stream of water running through it from end to end. A second smaller dormitory runs from east to west for the accommodation of the conventual officers, who were bound to sleep in the dormitory. Close to the refectory, but outside the cloisters, are the domestic offices connected with it; to the north, the kitchen, 47 feet square, surmounted by a lofty pyramidal roof, and the kitchen court; to the west, the butteries, pantries, &c. The infirmary had a small kitchen of its own. Opposite the refectory door in the cloister are two lavatories, an invariable adjunct to a monastic dining-hall, at which the monks washed before and after taking food.

The buildings devoted to hospitality were divided into three groups. The prior's group "entered at the south-east angle of the green court, placed near the most sacred part of the cathedral, as befitting the distinguished ecclesiastics or nobility who were assigned to him." The cellarer's buildings, were near the west end of the nave, in which ordinary visitors of the middle class were hospitably entertained. The inferior pilgrims and paupers were relegated to the north hall or almonry, just within the gate, as far as possible from the other two.

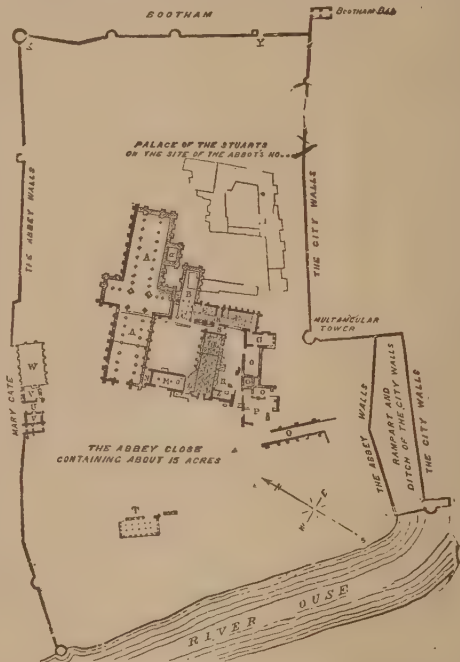
Westminster Abbey is another example of a great Benedictine abbey, identical in its general arrangements, so far as they can be traced, with those described above. The cloister and monastic buildings lie to the south side of the church. Parallel to the nave, on the south side of the cloister, was the refectory, with its lavatory at the door. On the eastern side we find the remains of the dormitory, raised on a vaulted substructure, and communicating with the south transept. The chapter-house opens out of the same alley of the cloister. The small cloister lies to the south-east of the larger cloister, and still farther to the east we have the remains of the infirmary, with the *table hall*, the refectory of those who were able to leave their chambers. The abbot's house formed a small court-yard at the west entrance, close to the inner gateway. Considerable portions of this remain, including the abbot's parlour, celebrated as "the Jerusalem Chamber," his hall, now used for the Westminster King's scholars, and the kitchen and butteries beyond.

St Mary's Abbey, York, of which the ground-plan is annexed, exhibits the usual Benedictine arrangements. The precincts are surrounded by a strong fortified wall on three sides, the river Ouse being sufficient protection on the fourth side. The entrance was by a strong gateway (U) to the north. Close to the entrance was a chapel, where is now the church of St Olaf (W), in which the new comers paid their devotions immediately on their arrival. Near the gate to the south was the guest's-hall or hospitium (T). The buildings are completely ruined, but enough remains to enable us to identify the grand cruciform church (A), the cloister-court with the chapter-house (B), the refectory (I), the kitchen-court with its offices (K, O, O), and the other principal apartments. The infirmary has perished completely.

Some Benedictine houses display exceptional arrangements, dependent upon local circumstances, e.g., the dormitory of Worcester runs from east to west, from the west walk of the cloister, and that of Durham is built over the west, instead of as usual, over the east walk; but, as a general rule, the arrangements deduced from the examples described may be regarded as invariable.

The history of Monasticism is one of alternate periods of decay and revival. With growth in popular esteem came increase in material wealth, leading to luxury and worldliness. The first religious ardour cooled, the strictness of the rule was relaxed, until by the 10th century the decay of discipline was so complete in France that the monks are said to have been frequently unacquainted with

the rule of St Benedict, and even ignorant that they were bound by any rule at all. (Robertson's *Church History*, ii. p. 538.) These alternations are reflected in the monastic buildings and the arrangements of the establishment



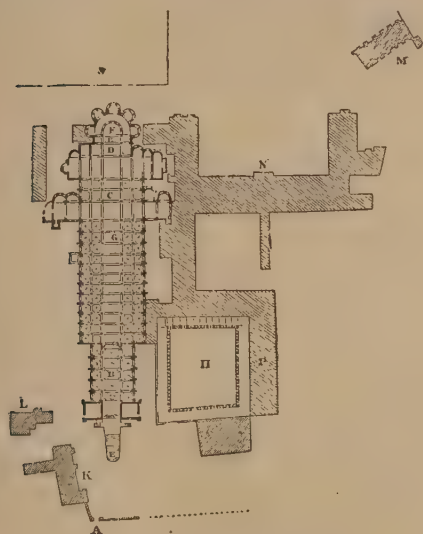
St Mary's Abbey, York (Benedictine).—Churton's Monastic Ruled.

- |                             |                              |
|-----------------------------|------------------------------|
| A. Church.                  | O. Offices.                  |
| B. Chapter-house.           | P. Cellars.                  |
| C. Vestibule to do.         | Q. Uncertain                 |
| E. Library or Scriptorium.  | R. Passage to Abbot's House. |
| F. Cella.                   | S. Passage to Common House.  |
| G. Necessary.               | T. Hospitium.                |
| H. Parlour.                 | U. Great Gate.               |
| I. Refectory.               | V. Porter's Lodge.           |
| K. Great Kitchen and Court. | W. Church of St Olaf.        |
| L. Cellarer's Office.       | X. Tower.                    |
| M. Cellars.                 | Y. Entrance from Bootham.    |
| N. Passage to Cloister.     |                              |

The reformation or these prevalent abuses generally took the form of the establishment of new monastic orders, with new and more stringent rules, requiring a modification of the architectural arrangements. One of the earliest of these reformed orders was the *Cluniac*. This order took its name from the little village of Clugny, 12 miles N.W. of Macon, near which, about A.D. 909, a reformed Benedictine abbey was founded by William, Duke of Auvergne, under Berno, abbot of Beaume. He was succeeded by Odo, who is often regarded as the founder of the order. The fame of Clugny spread far and wide. Its rigid rule was adopted by a vast number of the old Benedictine abbots, who placed themselves in affiliation to the mother society, while new foundations sprang up in large numbers, all owing allegiance to the "archabbot," established at Clugny. By the end of the 12th century the number of monasteries affiliated to Clugny in the various countries of Western Europe amounted to 2000. The monastic establishment of Clugny was one of the most extensive and magnificent in France. We may form some idea of its enormous dimensions from the fact recorded, that when, A.D. 1245, Pope Innocent IV., accompanied by twelve



cardinals, a patriarch, three archbishops, the two generals of the Carthusians and Cistercians, the king (St Louis), and three of his sons, the queen mother, Baldwin, Count of Flanders and Emperor of Constantinople, the Duke of Burgundy, and six lords, visited the abbey, the whole party, with their attendants, were lodged within the monastery without disarranging the monks, 400 in number. Nearly the whole of the abbey buildings, including the magnificent church, were swept away at the close of the last century. When the annexed ground-plan was taken, shortly before its destruction, nearly all the monastery, with the exception of the church, had been rebuilt. The church, the ground-plan of which bears a remarkable resemblance to that of Lincoln Cathedral, was of vast dimensions. It was 656 feet by 130 feet wide. The nave was 102 feet, and the aisles 60 feet high. The nave (G) had double



Abbey of Clugny, from Viollet le Duc.

- |                 |                     |                     |
|-----------------|---------------------|---------------------|
| A. Gateway.     | F. Tomb of St Hugh. | M. Bakehouse.       |
| B. Narthex.     | G. Nave.            | N. Abbey Buildings. |
| C. Choir.       | H. Cloister.        | O. Garden.          |
| D. High-Altar.  | K. Abbot's House.   | P. Refectory.       |
| E. Retro-Altar. | L. Guest-House.     |                     |

vaulted aisles on either side. Like Lincoln, it had an eastern as well as a western transept, each furnished with apsidal chapels to the east. The western transept was 213 feet long, and the eastern 123 feet. The choir terminated in a semicircular apse (F), surrounded by five chapels, also semicircular. The western entrance was approached by an ante-church, or *narthex* (B), itself an aisled church of no mean dimensions, flanked by two towers, rising from a stately flight of steps bearing a large stone cross. To the south of the church lay the cloister-court (H), of immense size, placed much further to the west than is usually the case. On the south side of the cloister stood the refectory (P), an immense building, 100 feet long and 60 feet wide, accommodating six longitudinal and three transverse rows of tables. It was adorned with the portraits of the chief benefactors of the abbey, and with Scriptural subjects. The end wall displayed the Last Judgment. We are unhappily unable to identify any other of the principal buildings (N). The abbot's residence (K), still partly standing, adjoined the entrance-gate. The guest-house (L) was close by. The bakehouse

(M), also remaining, is a detached couding of immense size. The first English house of the Clunian order was that of Lewes, founded by the Earl of Warren, *cir.* A.D. 1077. Of this only a few fragments of the domestic buildings exist. The best preserved Clunian houses in England are Castle Acre, Norfolk, and Wenlock, in Shropshire. Ground-plans of both are given in Britton's *Architectural Antiquities*. They show several departures from the Benedictine arrangement. In each the prior's house is remarkably perfect. All Clunian houses in England were French colonies, governed by priors of that nation. They did not secure their independence nor become "abbeys" till the reign of Henry VI. The Clunian revival, with all its brilliancy, was but short lived. The celebrity of this, as of other orders, worked its moral ruin. With their growth in wealth and dignity the Clunian foundations became as worldly in life and as relaxed in discipline as their predecessors, and a fresh reform was needed. The next great monastic revival, the Cistercian, arising in the last years of the 11th century, had a wider diffusion, and a longer and more honourable existence. Owing its real origin, as a distinct foundation of reformed Benedictines, in the year 1098, to a countryman of our own, Stephen Harding (a native of Dorsetshire, educated in the monastery of Sherborne), and deriving its name from Citeaux (*Cistercium*), a desolate and almost inaccessible forest solitude, on the borders of Champagne and Burgundy, the rapid growth and wide celebrity of the order is undoubtedly to be attributed to the enthusiastic piety of St Bernard, abbot of the first of the monastic colonies, subsequently sent forth in such quick succession by the first Cistercian houses, the far-famed abbey of Clairvaux (de Clara Valle), A.D. 1116.

The rigid self-abnegation, which was the ruling principle of this reformed congregation of the Benedictine order, extended itself to the churches and other buildings erected by them. The characteristic of the Cistercian abbeys was the extremest simplicity and a studied plainness. Only one tower—a central one—was permitted, and that was to be very low. Unnecessary pinnacles and turrets were prohibited. The triforium was omitted. The windows were to be plain and undivided, and it was forbidden to decorate them with stained glass. All needless ornament was proscribed. The crosses must be of wood; the candlesticks of iron. The renunciation of the world was to be evidenced in all that met the eye. The same spirit manifested itself in the choice of the sites of their monasteries. The more dismal, the more savage, the more hopeless a spot appeared, the more did it please their rigid mood. But they came not merely as ascetics, but as improvers. The Cistercian monasteries are, as a rule, found placed in deep well-watered valleys. They always stand on the border of a stream; not rarely, as at Fountains, the buildings extend over it. These valleys, now so rich and productive, wore a very different aspect when the brethren first chose them as the place of their retirement. Wide swamps, deep morasses, tangled thickets, wild impassable forests, were their prevailing features. The "Bright Valley," *Clara Vallis* of St Bernard, was known as the "Valley of Wormwood," infamous as a den of robbers. "It was a savage dreary solitude, so utterly barren that at first Bernard and his companions were reduced to live on beech leaves."—(Milman's *Lat. Christ.* vol. iii. p. 335.)

All Cistercian monasteries, unless the circumstances of the locality forbade it, were arranged according to one plan. The general arrangement and distribution of the various buildings, which went to make up one of these vast establishments, may be gathered from that of St Bernard's own Abbey of Clairvaux, which is here given.

It will be observed that the abbey precincts are surrounded by a strong wall, furnished at intervals with watch-

Clairvaux

**Clairvaux.** towers and other defensive works. The wall is nearly encircled by a stream of water, artificially diverted from the small rivelets which flow through the precincts, furnishing the establishment with an abundant supply in every part, for the irrigation of the gardens and orchards, the sanitary requirements of the brotherhood, and for the use of the offices and workshops. The precincts are divided across the centre by a wall, running from N. to S., into an outer and inner ward,—the former containing the menial, the latter the monastic buildings. The precincts are entered by a gateway (P), at the extreme western extremity, giving admission to the lower ward. Here the barns, granaries, stables, shambles, workshops, and workmen's lodgings were placed, without any regard to sym-

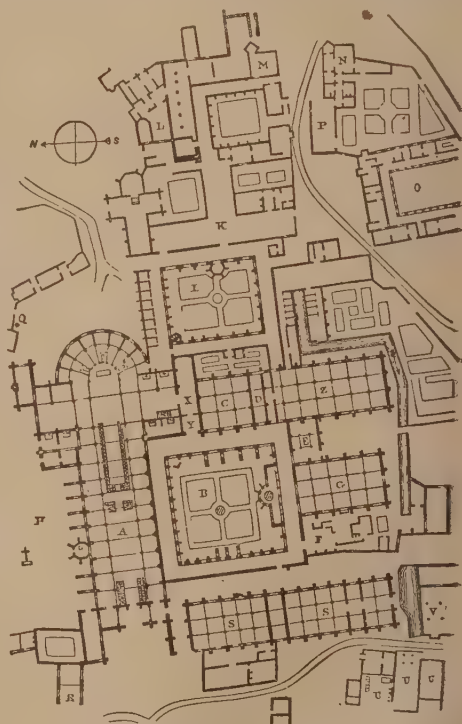
metry, convenience being the only consideration. Advancing eastwards, we have before us the wall separating the outer and inner ward, and the gatehouse (D) affording communication between the two. On passing through the gateway, the outer court of the inner ward was entered, with the western *façade* of the monastic church in front. Immediately on the right of entrance was the abbot's house (G), in close proximity to the guest-house (F). On the other side of the court were the stables, for the accommodation of the horses of the guests and their attendants (H). The church occupied a central position. To the south were the great cloister (A), surrounded by the chief monastic buildings, and further to the east the smaller cloister, opening out of which were the infirmary, novices' lodgings, and quarters for the aged monks. Still further to the east, divided from the monastic buildings by a wall, were the vegetable gardens and orchards, and tank for fish. The

large fish-ponds, an indispensable adjunct to any ecclesiastical foundation, on the formation of which the monks lavished extreme care and pains, and which often remain as almost the only visible traces of these vast establishments, were placed outside the abbey walls. The Plan No. 2 furnishes the ichnography of the distinctly monastic buildings on a larger scale. The usually unvarying arrangement of the Cistercian houses allows us to accept this as a type of the monasteries of this order. The church (A) is the chief feature. It consists of a vast nave of eleven bays, entered by a narthex, with a transept and short apsidal choir. (It may be remarked that the eastern limb in all unaltered Cistercian churches is remarkably short, and usually square.) To the east of each limb of



Clairvaux, No. 1 (Cistercian), General Plan.

- |                                 |                                      |                              |
|---------------------------------|--------------------------------------|------------------------------|
| A. Cloister.                    | H. Stables.                          | O. Public Press.             |
| B. Oven, and Corn and Oil-mill. | I. Wine-press and Hay-chamber.       | P. Gateway.                  |
| C. St Bernard's Cell.           | K. Parlour.                          | R. Remains of Old Monastery. |
| D. Chief Entrance.              | L. Workshops and workmen's Lodgings. | S. Oratory.                  |
| E. Tanks for Fish.              | M. Slaughter-house.                  | V. Tile-works.               |
| F. Guest House.                 | N. Barns and Stables.                | Y. Tile-kin.                 |
| G. Abbot's House.               |                                      | Y. Water-courses.            |



Clairvaux, No. 2 (Cistercian), Monastic Buildings.

- |                       |                                     |                              |
|-----------------------|-------------------------------------|------------------------------|
| A. Church.            | K. Infirmary.                       | S. Cellars and Store-houses. |
| B. Cloister.          | L. Lodgings of Novices.             | T. Water-course.             |
| C. Chapter-House.     | M. Old Guest-House.                 | U. Saw-mill and Oil-mill.    |
| D. Monks' Parlour.    | N. Old Abbot's Lodgings.            | V. Currier's Workshops.      |
| E. Calfactory.        | O. Cloister of Supernumerary Monks. | X. Sacristy.                 |
| F. Kitchen and Court. | P. Abbot's Hall.                    | Y. Little Library.           |
| G. Refectory.         | Q. Cell of St Bernard.              | Z. Undercroft of Dormitory.  |
| H. Cemetery.          | R. Stables.                         |                              |
| I. Little Cloister.   |                                     |                              |

metry, convenience being the only consideration. Advancing eastwards, we have before us the wall separating the outer and inner ward, and the gatehouse (D) affording communication between the two. On passing through the gateway, the outer court of the inner ward was entered, with the western *façade* of the monastic church in front. Immediately on the right of entrance was the abbot's house (G), in close proximity to the guest-house (F). On the other side of the court were the stables, for the accommodation of the horses of the guests and their attendants (H). The church occupied a central position. To the south were the great cloister (A), surrounded by the chief monastic buildings, and further to the east the smaller cloister, opening out of which were the infirmary, novices' lodgings, and quarters for the aged monks. Still further to the east, divided from the monastic buildings by a wall, were the vegetable gardens and orchards, and tank for fish. The

the transept are two square chapels, divided according to Cistercian rule by solid walls. Nine radiating chapels, similarly divided, surround the apse. The stalls of the monks, forming the ritual choir, occupy the four eastern bays of the nave. There was a second range of stalls in the extra western bays of the nave for the *fratres conversi*, or lay brothers. To the south of the church, so as to secure as much sun as possible, the cloister was invariably placed, except when local reasons forbade it. Round the cloister (B) were ranged the buildings connected with the monks' daily life. The chapter-house (C) always opened out of the east walk of the cloister in a line with the



**Clairvaux.** In Cistercian houses this was quadrangular, and was divided by pillars and arches into two or three aisles. Between it and the transept we find the sacristy (X), and a small book room (Y), *armarium*, where the brothers deposited the volumes borrowed from the library. On the other side of the chapter-house, to the south, is a passage (D) communicating with the courts and buildings beyond. This was sometimes known as the *parlour*, *colloquii locus*, the monks having the privilege of conversation here. Here also, when discipline became relaxed, traders, who had the liberty of admission, were allowed to display their goods. Beyond this we often find the *calefactorium* or *day-room*—an apartment warmed by flues beneath the pavement, where the brethren, half-frozen during the night offices, betook themselves after the conclusion of lands, to gain a little warmth, grease their sandals, and get themselves ready for the work of the day. In the plan before us this apartment (E) opens from the south cloister walk, adjoining the refectory. The place usually assigned to it is occupied by the vaulted substructure of the *dormitory* (Z). The *dormitory*, as a rule, was placed on the east side of the cloister, running over the *calefactory* and *chapter-house*, and joined the south transept, where a flight of steps admitted the brethren into the church for nocturnal services. Opening out of the dormitory was always the *necessarium*, planned with the greatest regard to health and cleanliness, a water-course invariably running from end to end. The refectory opens out of the south cloister at (G). The position of the refectory is usually a marked point of difference between Benedictine and Cistercian abbeys. In the former, as at Canterbury, the refectory ran east and west parallel to the nave of the church, on the side of the cloister furthest removed from it. In the Cistercian monasteries, to keep the noise and sound of dinner still further away from the sacred building, the refectory was built north and south, at right angles to the axis of the church. It was often divided, sometimes into two, sometimes, as here, into three aisles. Outside the refectory door, in the cloister, was the *lavatory*, where the monks washed their hands at dinner time. The buildings belonging to the material life of the monks lay near the refectory, as far as possible from the church, to the S.W. With a distinct entrance from the outer court was the kitchen court (F), with its buttery, scullery, and larder, and the important adjunct of a stream of running water. Further to the west, projecting beyond the line of the west front of the church, were vast vaulted apartments (SS), serving as cellars and storehouses, above which was the dormitory of the *conversi*. Detached from these, and separated entirely from the monastic buildings, were various workshops, which convenience required to be banished to the outer precincts, a saw-mill and oil-mill (UU) turned by water, and a currier's shop (V), where the sandals and leathern girdles of the monks were made and repaired.

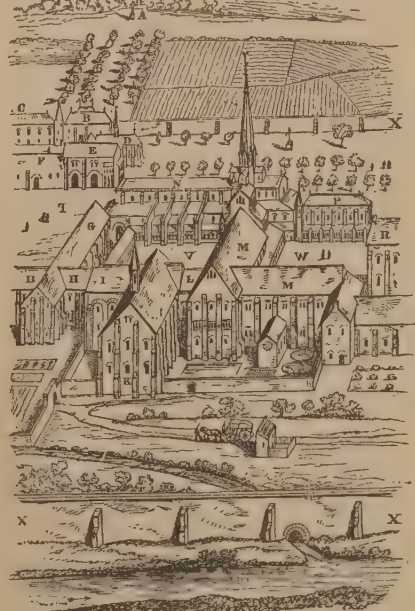
Returning to the cloister, a vaulted passage admitted to the small cloister (I), opening from the north side of which were eight small cells, assigned to the scribes employed in copying works for the library, which was placed in the upper story, accessible by a turret staircase. To the south of the small cloister a long hall will be noticed. This was a *lecture-hall*, or rather a hall for the religious disputations customary among the Cistercians. From this cloister opened the *infirmary* (K), with its hall, chapel, cells, blood-letting house, and other dependencies. At the eastern verge of the vast group of buildings we find the *novices' lodgings* (L), with a third cloister near the novices' quarters and the original guest-house (M). Detached from the great mass of the monastic edifices was the original abbot's house (N), with its dining-hall (P). Closely adjoining to this, so that the eye of the father of

the whole establishment should be constantly over those who stood the most in need of his watchful care,—those who were training for the monastic life, and those who had worn themselves out in its duties,—was a fourth cloister (O), with annexed buildings, devoted to the aged and infirm members of the establishment. The cemetery, the last resting-place of the brethren, lay to the north side of the nave of the church (H).

It will be seen that the arrangement of a Cistercian monastery was in accordance with a clearly-defined system, and admirably adapted to its purpose.

The base court nearest to the outer wall contained the buildings belonging to the functions of the body as agriculturalists and employers of labour. Advancing into the inner court, the buildings devoted to hospitality are found close to the entrance; while those connected with the supply of the material wants of the brethren,—the kitchen, cellars, &c.,—form a court of themselves outside the cloister, and quite detached from the church. The church refectory, dormitory, and other buildings belonging to the professional life of the brethren, surround the great cloister. The small cloister beyond, with its scribes' cells, library, hall for disputations, &c., is the centre of the literary life of the community. The requirements of sickness and old age are carefully provided for in the infirmary cloister, and that for the aged and infirm members of the establishment. The same group contains the quarters of the novices.

This stereotyped arrangement is further illustrated by Cîteaux the accompanying bird's eye view of the mother establish-



Bird's eye View of Cîteaux.

- |                               |                            |                                             |
|-------------------------------|----------------------------|---------------------------------------------|
| A. Cross.                     | H. Abbot's House.          | R. Infirmary.                               |
| B. Gate-House.                | I. Kitchen.                | S. Door to the Church for the Lay Brethren. |
| C. Almonry.                   | K. Refectory.              | T. Base Court.                              |
| D. Chapel.                    | L. Staircase to Dormitory. | V. Great Cloister.                          |
| E. Inner Gate-House.          | M. Dormitory.              | W. Small Cloister.                          |
| F. Stable.                    | N. Church.                 | X. Boundary Wall.                           |
| G. Dormitory of Lay Brethren. | P. Library.                |                                             |

ment of Cîteaux. A cross (A), planted on the high road.  
I. — 3

Cîteaux.

directs travellers to the gate of the monastery, reached by an avenue of trees. On one side of the gate-house (B) is a long building (C), probably the almonry, with a dormitory above for the lower class of guests. On the other side is a chapel (D). As soon as the porter heard a stranger knock at the gate, he rose, saying, *Deo gratias*, the opportunity for the exercise of hospitality being regarded as a cause for thankfulness. On opening the door he welcomed the new arrival with a blessing—*Benedicite*. He fell on his knees before him, and then went to inform the abbot. However important the abbot's occupations might be, he at once hastened to receive him whom heaven had sent. He also threw himself at his guest's feet, and conducted him to the chapel (D) purposely built close to the gate. After a short prayer, the abbot committed the guest to the care of the brother hospitaller, whose duty it was to provide for his wants, and conduct the beast on which he might be riding to the stable (F), built adjacent to the inner gate-house (E). This inner gate conducted into the base court (T), round which were placed the barns, stables, cow-sheds, &c. On the eastern side stood the dormitory of the lay brothers, *fratres conversi* (G), detached from the cloister, with cellars and storehouses below. At (H), also outside the monastic buildings proper, was the abbot's house, and annexed to it the guest-house. For these buildings there was a separate door of entrance into the church (S). The large cloister, with its surrounding arcades, is seen at V. On the south end projects the refectory (K), with its kitchen at (I), accessible from the base court. The long gabled building on the east side of the cloister contained on the ground floor the chapter-house and calefactory, with the monks' dormitory above (M), communicating with the south transept of the church. At (L) was the staircase to the dormitory. The small cloister is at (W), where were the *carols* or cells of the scribes, with the library (P) over, reached by a turret staircase. At (R) we see a portion of the infirmary. The whole precinct is surrounded by a strong buttressed wall (XXX), pierced with arches, through which streams of water are introduced. It will be noticed that the choir of the church is short, and has a square end instead of the usual apse. The tower, in accordance with the Cistercian rule, is very low. The windows throughout accord with the studied simplicity of the order.

England.

The English Cistercian houses, of which there are such extensive and beautiful remains at Fountains, Rievaulx, Kirkstall, Tintern, Netley, &c., were mainly arranged after the same plan, with slight local variations. As an example, we give the ground-plan of Kirkstall Abbey, which is one of the best preserved and least altered. The church here is of the Cistercian type, with a short chancel of two squares, and transepts with three eastward chapels to each, divided by solid walls (2 2 2). The whole is of the most studied plainness. The windows are unornamented, and the nave has no triforium. The cloister to the south (4) occupies the whole length of the nave. On the east side stands the two-aisled chapter house (5), between which and the south transept is a small sacristy (3), and on the other side two small apartments, one of which was probably the parlour, (6). Beyond this stretches southward the calefactory or day-room of the monks (14). Above this whole range of building runs the monks' dormitory, opening by stairs into the south transept of the church. At the other end were the necessaries. On the south side of the cloister we have the remains of the old refectory (11), running, as in Benedictine houses, from east to west, and the new refectory (12), which, with the increase of the inmates of the house, superseded it, stretching, as is usual in Cistercian houses, from north to south. Adjacent to this apartment are the remains of the kitchen, pantry, and

buttery. The arches of the lavatory are to be seen near the refectory entrance. The western side of the cloister is, as usual, occupied by vaulted cellars, supporting on the upper story the dormitory of the lay brothers (8). Extending from the south-east angle of the main group of buildings are the walls and foundations of a secondary group of considerable extent. These have been identified either with the hospitium or with the abbot's house, but they occupy the position in which the infirmary is more usually found. The hall was a very spacious apartment, measuring 83 feet in length by 48 feet 9 inches in breadth.



Kirkstall Abbey, Yorkshire (Cistercian).

- |                                                 |                                                                 |
|-------------------------------------------------|-----------------------------------------------------------------|
| 1. Church.                                      | 10. Common Room.                                                |
| 2. Chapels.                                     | 11. Old Refectory.                                              |
| 3. Sacristy.                                    | 12. New Refectory.                                              |
| 4. Cloister.                                    | 13. Kitchen Court.                                              |
| 5. Chapter-House.                               | 14. Calefactory or Day-Room.                                    |
| 6. Parlour.                                     | 15. Kitchen and Offices.                                        |
| 7. Funishment Cell (C).                         | 16-19. Uncertain; perhaps Offices connected with the Infirmary. |
| 8. Cellars, with Dormitories for conversi over. | 20. Infirmary or Abbot's House.                                 |
| 9. Guest-House.                                 |                                                                 |

Kirkstall.

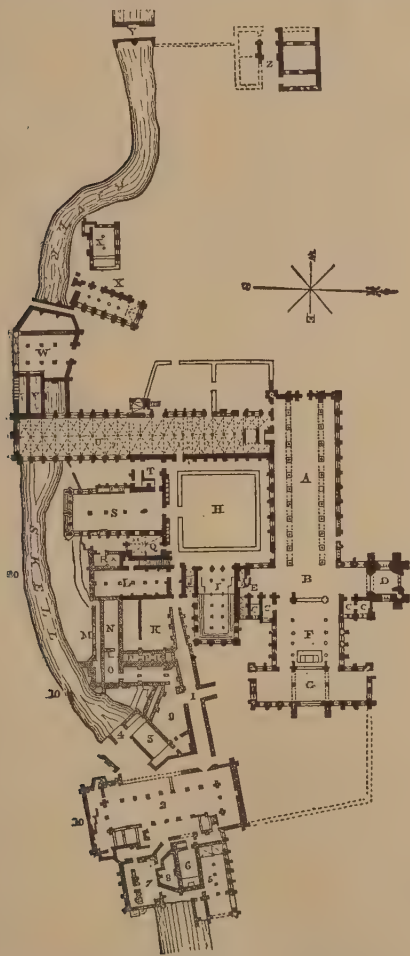
and was divided by two rows of columns. The fish-ponds lay between the monastery and the river to the south. The abbey mill was situated about 80 yards to the north-west. The mill-pool may be distinctly traced, together with the gowt or mill stream.

Fountains Abbey, first founded A.D. 1132, deserves special notice, as one of the largest and best preserved Cistercian houses in England. But the earlier buildings received considerable additions and alterations in the later period of the order, causing deviations from the strict Cistercian type. The church stands a short distance to the north of the river Skell, the buildings of the abbey stretching down to and even across the stream. We have the cloister (H) to the south, with the three-aisled chapter-house (I) and calefactory (L) opening from its eastern walk, and the refectory (S), with the kitchen (Q) and buttery (T) attached, at right angles to its southern walk. Parallel with the western walk is an immense vaulted substructure (U), incorrectly styled the cloisters, serving as cellars and store-rooms, and supporting the dormitory of the *conversi* above. This building extended across the river. At its

Fountains.



S.W. corner were the necessities (V), also built, as usual, above the swiftly flowing stream. The monks' dormitory was in its usual position above the chapter-house, to the south of the transept. As peculiarities of arrangement may be noticed the position of the kitchen (Q), between the refectory and calefactory, and of the infirmary (W) (unless there is some error in its designation) above the river to



Ground Plan of Fountains Abbey, Yorkshire.

- |                        |                       |                   |
|------------------------|-----------------------|-------------------|
| A. Nave of the Church. | N. Cellar.            | Z. Gate-House.    |
| B. Transept.           | O. Brew House.        | Assort's House.   |
| C. Chapels.            | P. Prisons.           | 1. Passage.       |
| D. Tower.              | Q. Kitchen.           | 2. Great Hall.    |
| E. Sacristy.           | R. Offices.           | 3. Refectory.     |
| F. Choir.              | S. Refectory.         | 4. Buttery.       |
| G. Chapel of Nine      | T. Buttery.           | 5. Storehouse.    |
| Altars.                | U. Cellars and Store- | 6. Chapel.        |
| H. Cloister.           | houses.               | 7. Kitchen.       |
| I. Chapter-House.      | V. Necessary.         | 8. Ashpit.        |
| K. Base Court.         | W. Infirmary (I).     | 9. Yard.          |
| L. Calefactory.        | X. Guest-Houses.      | 10. Kitchen Tank. |
| M. Water Course.       | Y. Mill Bridge.       |                   |

the west, adjoining the guest-houses (XX). We may also call attention to the greatly lengthened choir, commenced by Abbot John of York, 1203-1211, and carried on by his successor, terminating, like Durham Cathedral, in an

eastern transept, the work of Abbot John of Kent, 1220-1247, and to the tower (D), added not long before the dissolution by Abbot Huby, 1494-1526, in a very unusual position at the northern end of the north transept. The abbot's house, the largest and most remarkable example of this class of buildings in the kingdom, stands south to the east of the church and cloister, from which it is divided by the kitchen court (K), surrounded by the ordinary domestic offices. A considerable portion of this house was erected on arches over the Skell. The size and character of this house, probably, at the time of its erection, the most spacious house of a subject in the kingdom, not a castle, bespeaks the wide departure of the Cistercian order from the stern simplicity of the original foundation. The hall (2) was one of the most spacious and magnificent apartments in mediæval times, measuring 170 feet by 70 feet. Like the hall in the castle at Winchester, and Westminster Hall, as originally built, it was divided by 18 pillars and arches, with 3 aisles. Among other apartments, for the designation of which we must refer to the ground-plan, was a domestic oratory or chapel, 46½ feet by 23 feet, and a kitchen (7), 50 feet by 38 feet. The whole arrangements and character of the building bespeak the rich and powerful feudal lord, not the humble father of a body of hard-working brethren, bound by vows to a life of poverty and self-denying toil. In the words of Dean Milman, "the superior, once a man bowed to the earth with humility, care-worn, pale, emaciated, with a coarse habit bound with a cord, with naked feet, had become an abbot on his curvetting palfrey, in rich attire, with his silver cross before him, travelling to take his place amid the lordliest of the realm."—(*Lat. Christ.*, vol. iii. p. 330.)

The buildings of the *Austin Canons* or *Black Canons* Black (so called from the colour of their habit) present few Austin Canons distinctive-peculiarities. This order had its first seat in England at Colchester, where a house for Austin Canons was founded about A.D. 1105, and it very soon spread widely. As an order of regular clergy, holding a middle position between monks and secular canons, almost resembling a community of parish priests living under rule, they adopted naves of great length to accommodate large congregations. The choir is usually long, and is sometimes, as at Llanthony and Christ Church (Twynham), shut off from the aisles, or, as at Bolton, Kirkham, &c., is destitute of aisles altogether. The nave in the northern houses, not unfrequently, had only a north aisle, as at Bolton, Brinkburn, and Lanercost. The arrangement of the monastic buildings followed the ordinary type. The prior's lodge was almost invariably attached to the S.W. angle of the nave. The annexed plan of the Abbey of St Augustine's at Bristol, now the cathedral church of Bristol



St Augustine's Abbey, Bristol (Bristol Cathedral).

- |                     |                     |                       |
|---------------------|---------------------|-----------------------|
| A. Church.          | H. Kitchen.         | S. Priars' Lodging.   |
| B. Great Cloister.  | I. Kitchen Court.   | T. King's Hall.       |
| C. Little Cloister. | K. Cellar.          | V. Guest-House.       |
| D. Chapter-House.   | L. Abbot's Hall.    | W. Abbey Gateway.     |
| E. Calefactory.     | P. Abbot's Gateway. | X. Bannu Stables, &c. |
| F. Refectory.       | R. Infirmary.       | Y. Lavatory.          |
| G. Parloir.         |                     |                       |

that city, shows the arrangement of the buildings, which departs very little from the ordinary Benedictine type. The Austin Canons' house at Thornton, in Lincolnshire, is remarkable for the size and magnificence of its gate-house, the upper floors of which formed the guest-house of the establishment, and for possessing an octagonal chapter-house of Decorated date.

Premônstratensian.

The *Premônstratensian* regular canons, or White Canons, had as many as 35 houses in England, of which the most perfect remaining are those of Easby, Yorkshire, and Bayham, Sussex. The head house of the order in England was Welbeck. This order was a reformed branch of the Austin canons, founded, A.D. 1119, by Norbert (born at Xanten, on the Lower Rhine, c. 1080) at Prémontré, a secluded marshy valley in the forest of Concy, in the diocese of Laon. The order spread widely. Even in the founder's lifetime it possessed houses in Syria and Palestine. It long maintained its rigid austerity, till in the course of years wealth impaired its discipline, and its members sank into indolence and luxury. The *Premônstratensians* were brought to England shortly after A.D. 1140, and were first settled at Newhouse, in Lincolnshire, near the Humber. The ground-plan of Easby Abbey, owing to its situation on the edge of the steeply-sloping banks of a river, is singularly irregular. The cloister is duly placed, on the south side of the church, and the chief buildings occupy their usual positions round it. But the cloister garth, as at Chichester, is not rectangular, and all the surrounding buildings are thus made to sprawl in a very awkward fashion. The church follows the plan adopted by the Austin canons in their northern abbeys, and has only one aisle to the nave—that to the north; while the choir is long, narrow, and aisleless. Each transept has an aisle to the east, forming three chapels.

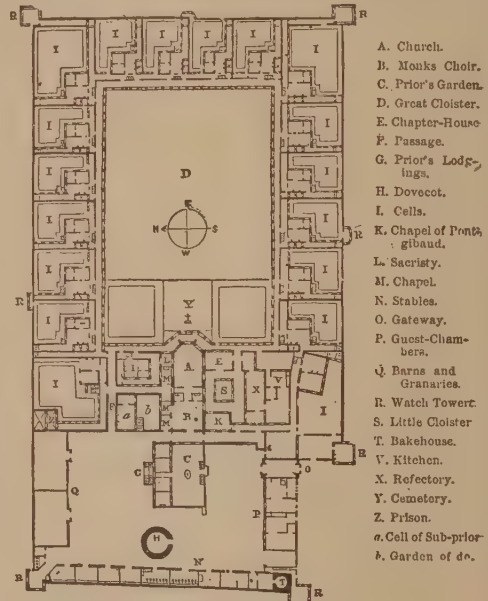
The church at Baynam was destitute of aisle either to nave or choir. The latter terminated in a three-sided apse. This church is remarkable for its exceeding narrowness in proportion to its length. Extending in longitudinal dimensions 257 feet, it is not more than 25 feet broad. To adopt the words of Mr Beresford Hope—"Storn *Premônstratensian* canons wanted no congregations, and cared for no processions; therefore they built their church like a long room."

Carthusian.

The *Carthusian* order, on its establishment by St Bruno, about A.D. 1084, developed a greatly modified form and arrangement of a monastic institution. The principle of this order, which combined the cenobitic with the solitary life, demanded the erection of buildings on a novel plan. This plan, which was first adopted by St Bruno and his twelve companions at the original institution at Chartreux, near Grenoble, was maintained in all the *Carthusian* establishments throughout Europe, even after the ascetic severity of the order had been to some extent relaxed, and the primitive simplicity of their buildings had been exchanged for the magnificence of decoration which characterises such foundations as the *Certosas* of Pavia and Florence. According to the rule of St Bruno, all the members of a *Carthusian* brotherhood lived in the most absolute solitude and silence. Each occupied a small detached cottage, standing by itself in a small garden surrounded by high walls and connected by a common corridor or cloister. In these cottages or cells a *Carthusian* monk passed his time in the strictest asceticism, only leaving his solitary dwelling to attend the services of the Church, except on certain days when the brotherhood assembled in the refectory.

The peculiarity of the arrangements of a *Carthusian* monastery, or *charter-house*, as it was called in England, from a corruption of the French *chartreux*, is exhibited in

the plan of that of Clermont, from Viollet le Duc. The *Clermont*, whole establishment is surrounded with a wall, furnished at intervals with watch towers (R). The enclosure is divided into two courts, of which the eastern court, surrounded by a cloister, from which the cottages of the monks (I) open, is much the larger. The two courts are

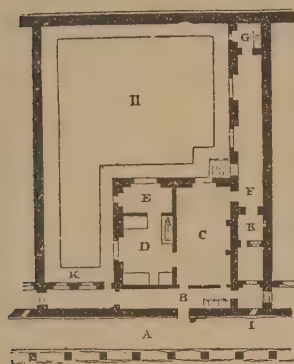


Carthusian Monastery of Clermont.

divided by the main buildings of the monastery, including the church, the sanctuary (A), divided from (B) the monks' choir, by a screen with two altars, the smaller cloister to the south (S) surrounded by the chapter-house (E), the refectory (X)—these buildings occupying their normal position—and the chapel of Pontgibaud (K). The kitchen with its offices (V) lies behind the refectory, accessible from the outer court without entering the cloister. To the north of the church, beyond the sacristy (L), and the side chapels (M), we find the cell of the sub-prior (a), with its garden. The lodgings of the prior (Q) occupy the centre of the outer court, immediately in front of the west door of the church, and face the gateway of the convent (O). A small raised court with a fountain (C) is before it. This outer court also contains the guest-chambers (P), the stables, and lodgings of the lay brothers (N), the barns and granaries (Q), the dovecot (H), and the bakehouse (T). At (Z) is the prison. (In this outer court, in all the earlier foundations, as at Witham, there was a smaller church in addition to the larger church of the monks.) The outer and inner court are connected by a long passage (F), wide enough to admit a cart laden with wood to supply the cells of the brethren with fuel. The number of cells surrounding the great cloister is 18. They are all arranged on a uniform plan. Each little dwelling contains three rooms: a sitting-room (C), warmed with a stove in winter; a sleeping-room (D), furnished with a bed, a table, a bench, and a bookcase; and a closet (E). Between the cell and the cloister gallery (A) is a passage or corridor (B), cutting off the inmate of the cell from all sound or movement which might interrupt his meditations. The superior had



Clermont. free access to this corridor, and through open niches was able to inspect the garden without being seen. At (I) is the hatch or turn-table, in which the daily allowance of food was deposited by a brother appointed for that purpose, affording no view either inwards or outwards. (H) is the garden,



Carthusian Cell, Clermont.

cultivated by the occupant of the cell. At (K) is the wood-house. (F) is a covered walk, with the necessary at the end. These arrangements are found with scarcely any variation in all the charter-houses of Western Europe. The Yorkshire Charter-house of Mount Grace, founded by Thomas Holland the young Duke of Surrey, nephew of Richard II., and Marshal of England, during the revival of the popularity of the order, about A.D. 1397, is the most perfect and best preserved English example. It is characterised by all the simplicity of the order. The church is a modest building, long, narrow, and aisleless. Within the wall of enclosure are two courts. The smaller of the two, the south, presents the usual arrangement of church, refectory, &c., opening out of a cloister. The buildings are plain and solid. The northern court contains the cells, 14 in number. It is surrounded by a double stone wall, the two walls being about 30 feet or 40 feet apart. Between these, each in its own garden, stand the cells; low-built two-storied cottages, of two or three rooms on the ground-floor, lighted with a larger and a smaller window to the side, and provided with a doorway to the court, and one at the back, opposite to one in the outer wall, through which the monk may have conveyed the sweepings of his cell and the refuse of his garden to the "eremus" beyond. By the side of the door to the court is a little hatch, through which the daily pittance of food was supplied, so contrived by turning at an angle in the wall that no one could either look in or look out. A very perfect example of this hatch—an arrangement belonging to all Carthusian houses—exists at Miraflores, near Burgos, which remains nearly as it was completed in 1480.

There were only nine Carthusian houses in England. The earliest was that at Witham in Somersetshire, founded by Henry II., by whom the order was first brought into England. The wealthiest and most magnificent was that of Shene or Richmond in Surrey, founded by Henry V. about A.D. 1414. The dimensions of the buildings at Shene are stated to have been remarkably large. The great court measured 300 feet by 250 feet; the cloisters were a square of 500 feet; the hall was 110 feet in length by 60 feet in breadth. The most celebrated historically is the Charter-house of London, founded by Sir Walter Manny A.D. 1371, the name of which is preserved by the famous

public school established on the site by Thomas Sutton A.D. 1611.

An article on monastic arrangements would be incomplete without some account of the convents of the Mendicant or Preaching Friars, including the Black Friars or Dominicans, the Grey or Franciscans, the White or Carmelites, the Erenite or Austin Friars. These orders arose at the beginning of the 13th century, when the Benedictines, together with their various reformed branches, had terminated their active mission, and Christian Europe was ready for a new religious revival. Planting themselves, as a rule, in large towns, and by preference in the poorest and most densely populated districts, the Preaching Friars were obliged to adapt their buildings to the requirements of the site. Regularity of arrangement, therefore, was not possible, even if they had studied it. Their churches, built for the reception of large congregations of hearers rather than worshippers, form a class by themselves, totally unlike those of the elder orders in ground-plan and character. They were usually long parallelograms unbroken by transepts. The nave very usually consisted of two equal bodies, one containing the stalls of the brotherhood, the other left entirely free for the congregation. The constructional choir is often wanting, the whole church forming one uninterrupted structure, with a continuous range of windows. The east end was usually square, but the Friars Church at Winchelsea had a polygonal apse. We not unfrequently find a single transept, sometimes of great size, rivaling or exceeding the nave. This arrangement is frequent in Ireland, where the numerous small friaries afford admirable exemplifications of these peculiarities of ground-plan. The friars churches were at first destitute of towers; but in the 14th and 15th centuries, tall, slender towers were commonly inserted between the nave and the choir. The Grey Friars at Lynn, where the tower is hexagonal, is a good example. The arrangement of the monastic buildings is equally peculiar and characteristic. We miss entirely the regularity of the buildings of the earlier orders. At the Jacobins at Paris, a cloister lay to the north of the long narrow church of two parallel aisles, while the refectory—a room of immense length, quite detached from the cloister—stretched across the area before the west front of the church. At Toulouse the nave also has two parallel aisles, but the choir is apsidal, with radiating chapels. The refectory stretches northwards at right angles to the cloister, which lies to the north of the church, having the chapter-house and sacristy on the east. As examples of English friaries the Dominican house at Norwich, and those of the Dominicans and Franciscans at Gloucester, may be mentioned. The church of the Black Friars of Norwich departs from the original type in the nave (now St Andrew's Hall), in having regular aisles. In this it resembles the earlier examples of the Grey Friars at Reading. The choir is long and aisleless; an hexagonal tower between the two, like that existing at Lynn, has perished. The cloister and monastic buildings remain tolerably perfect to the north. The Dominican convent at Gloucester still exhibits the cloister-court, on the north side of which is the desecrated church. The refectory is on the west side, and on the south the dormitory of the 13th century. This is a remarkably good example. There were 18 cells or cubicles on each side, divided by partitions, the bases of which remain. On the east side was the prior's house, a building of later date. At the Grey or Franciscan Friars, the church followed the ordinary type in having two equal bodies, each gabled, with a continuous range of windows. There was a slender tower between the nave and choir. Of the convents of the Carmelite or White Friars we have a good example in the Abbey of Hulme, near Alnwick, the first of the order in England, founded A.D. 1240. The church is a narrow

**Mendicant Friars.** oblong, destitute of aisles, 123 feet long by only 26 feet wide. The cloisters are to the south, with the chapter-house, &c., to the east, with the dormitory over. The prior's lodge is placed to the west of the cloister. The guest-houses adjoin the entrance gateway, to which a chapel was annexed on the south side of the conventual area. The nave of the church of the Austin Friars or Eremites in London is still standing. It is of Decorated date, and has wide centre and side aisles, divided by a very light and graceful arcade. Some fragments of the south walk of the cloister of the Grey Friars exist among the buildings of Christ's Hospital or the Blue-Coat School. Of the Black Friars all has perished but the name. Taken as a whole, the remains of the establishments of the friars afford little warrant for the bitter invective of the Benedictine of St Alban's, Matthew Paris:—"The friars who have been founded hardly 40 years have built residences as the palaces of kings. These are they who, enlarging day by day their sumptuous edifices, encircling them with lofty walls, lay up in them their incalculable treasures, imprudently transgressing the bounds of poverty, and violating the very fundamental rules of their profession." Allowance must here be made for jealousy of a rival order just rising in popularity.

**Cells.**

Every large monastery had depending upon it one or more smaller establishments known as *cells*. These cells were monastic colonies, sent forth by the parent house, and planted on some outlying estate. As an example, we may refer to the small religious house of St Mary Magdalene's, a cell of the great Benedictine house of St Mary's, York, in the valley of the Witham, to the south-east of the city of Lincoln. This consists of one long narrow range of building, of which the eastern part formed the chapel, and the western contained the apartments of the handful of monks of which it was the home. To the east may be traced the site of the abbey mill, with its dam and mill-lead. These cells, when belonging to a Cluniac house, were called *Obedientiæ*.

The plan given by Viollet le Duc of the Priory of St Jean des Bons Hommes, a Cluniac cell, situated between the town of Avallon and the village of Savigny, shows that these diminutive establishments comprised every essential feature of a monastery,—chapel, cloister, chapter-room, refectory, dormitory, all grouped according to the recognised arrangement.

These Cluniac *obedientiæ* differed from the ordinary Benedictine cells in being also places of punishment, to which monks who had been guilty of any grave infringement of the rules were relegated as to a kind of penitentiary. Here they were placed under the authority of a prior, and were condemned to severe manual labour, fulfilling the duties usually executed by the lay brothers, who acted as farm-servants.

The outlying farming establishments belonging to the monastic foundations were known as *villas* or *granges*. They gave employment to a body of *conversi* and labourers under the management of a monk, who bore the title of *Brother Hospitaller*—the granges, like their parent institutions, affording shelter and hospitality to belated travellers.

**Authorities:**—Dugdale, *Monasticon*; Fosbrooke, *British Monachism*; Helyot, *Dictionnaire des Ordres Religieux*; Lenoir, *Architecture Monastique*; Viollet le Duc, *Dictionnaire Raisonné de l'Architecture Française*; Walcott, *Conventual Arrangement*; Willis, *Abbey of St Gall*; *Archæological Journal*, vol. v., *Conventual Buildings of Canterbury*; Curzon, *Monasteries of the Levant*. (E. v.)

ABBIATE GRASSO, a town in the north of Italy, near the Ticino, 14 miles W.S.W. of Milan. It has silk manufactures, and contains about 5000 inhabitants.

ABBON OF FLEURY, or ABBO FLORIACENSIS, a learned Frenchman, born near Orleans in 945. He distinguished himself in the schools of Paris and Rheims, and was a proficient in science, as known in his time. After spending two years in England, assisting Archbishop Oswald of York in restoring the monastic system, he returned to France, and was made Abbot of Fleury (970). He was twice sent to Rome by Robert the Wise (986, 996), and on each occasion succeeded in warding off a threatened papal interdict. He was killed in 1004, in endeavouring to quell a monkish revolt. He wrote an epitome of the *Lives of the Roman Pontiffs*, besides controversial treatises, letters, &c.

ABBOT, the head and chief governor of a community of monks, called also in the East *Archimandrita*, from *mandra*, "a fold," or *Hegumenos*. The name abbot is derived from the Hebrew אב, *Ab*, or *father*, through the Syriac *Abba*. It had its origin in the monasteries of Syria, whence it spread through the East, and soon became accepted generally in all languages as the designation of the head of a monastery. At first it was employed as a respectful title for any monk, as we learn from St Jerome (in Epist. ad Gal. iv. 6, in Matt. xxiii. 9), but it was soon restricted to the Superior.

The name abbot, though general in the West, was not universal. Among the Dominicans, Carmelites, Augustines, &c., the superior was called *Præpositus*, "Provost," and *Prior*; among the Franciscans, *Custos*, "Guardian," and by the monks of Camaldoli, *Major*.

Monks, as a rule, were laymen, nor at the outset was the abbot any exception. All orders of clergy, therefore, even the "doorkeeper," took precedence of him. For the reception of the sacraments, and for other religious offices, the abbot and his monks were commanded to attend the nearest church.—(*Novellæ*, 133, c. ii.) This rule naturally proved inconvenient when a monastery was situated in a desert, or at a distance from a city, and necessity compelled the ordination of abbots. This innovation was not introduced without a struggle, ecclesiastical dignity being regarded as inconsistent with the higher spiritual life, but, before the close of the 5th century, at least in the East, abbots seem almost universally to have become deacons, if not presbyters. The change spread more slowly in the West, where the office of abbot was commonly filled by laymen till the end of the 7th century, and partially so up to the 11th. Ecclesiastical Councils were, however, attended by abbots. Thus, at that held at Constantinople, A.D. 448, for the condemnation of Eutyches, 23 archimandrites or abbots sign, with 30 bishops, and, *cir.* A.D. 690, Archbishop Theodore promulgated a canon, inhibiting bishops from compelling abbots to attend councils. Examples are not uncommon in Spain and in England in Saxon times. Abbots were permitted by the Second Council of Niceæ, A.D. 787, to ordain their monks to the inferior orders. This rule was adopted in the West, and the strong prejudice against clerical monks having gradually broken down, eventually monks, almost without exception, belonged to some grade of the ministry.

Originally no abbot was permitted to rule over more than one monastic community, though, in some exceptional cases, Gregory the Great allowed the rule to be broken. As time went on, violations of the rule became increasingly frequent, as is proved by repeated enactments against it. The cases of Wilfrid of York, *cir.* A.D. 675, who held the abbacy of the monasteries he had founded at Hexham and Ripon, and of Aldhelm, who, at the same date, stood in the same double relation to those of Malmesbury, Frome, and Bradford, are only apparent transgressions of the rule. We find more decided instances of plurality in Hugh of the royal Carolingian house, *cir.* 720, who was at the same



time Bishop of Rouen, Paris, Bayeux, and Abbot of Fontenelle and Jumièges; and Sidonius, Bishop of Constance, who, being already Abbot of Reichenau, took the abbacy of St Gall also. Hatto of Mentz, *cir.* 912, annexed to his see no less than 12 abbeys.

In Egypt, the first home of monasticism, we find *abbots in chief* or *archimandrites* exercising jurisdiction over a large number of communities, each of which had its own abbot. Thus, Cassian speaks of an abbot in the Thebaid who had 500 monks under him, a number exceeded in other cases. In later times also, general jurisdiction was exercised over the houses of their order by the abbots of Monte Cassino, St Dalmatius, Clugny, &c. The abbot of Cassino was styled *Abbas Abbatum*. The chiefs of other orders had the titles of *Abbas Generalis*, or *Magister*, or *Minister Generalis*.

Abbots were originally subject to episcopal jurisdiction, and continued generally so, in fact, in the West till the 11th century. The *Code of Justinian* (lib. i. tit. iii. de Ep. leg. xl.), expressly subordinates the abbot to episcopal oversight. The first case recorded of the partial exemption of an abbot from episcopal control is that of Faustus, Abbot of Lerins, at the Council of Arles, A.D. 456; but the oppressive conduct, and exorbitant claims and exactions of bishops, to which this repugnance to episcopal control is to be traced, far more than to the arrogance of abbots, rendered it increasingly frequent, and, in the 6th century, the practice of exempting religious houses partly or altogether from episcopal control, and making them responsible to the Pope alone, received an impulse from Gregory the Great. These exceptions, though introduced with a good object, had grown into a wide-spread and crying evil by the 12th century, virtually creating an *imperium in imperio*, and entirely depriving the bishop of all authority over the chief centres of power and influence in his diocese. In the 12th century the abbots of Fulda claimed precedence of the Archbishop of Cologne. Abbots more and more aped episcopal state, and in defiance of the express prohibition of early councils, and the protests of St Bernard and others, adopted the episcopal insignia of mitre, ring, gloves, and sandals. A mitre is said to have been granted to the Abbot of Bobbio by Pope Theodorus I., A.D. 643, and to the Abbot of St Savianus by Sylvester II., A.D. 1000. Duncane asserts that pontifical insignia were first assigned to abbots by John XVIII., A.D. 1004-1009; but the first undoubted grant is said to be that to the Abbot of St Maximilian at Treves, by Gregory VII. (Hildebrand), A.D. 1073-1085. The mitred abbots in England were those of Abingdon, St Alban's, Bardney, Battle, Bury St Edmund's, St Augustine's Canterbury, Colchester, Croyland, Evesham, Glastonbury, Gloucester, St Bene's Hulme, Hyde, Malmesbury, Peterborough, Ramsey, Reading, Selby, Shrewsbury, Tavistock, Thorney, Westminster, Winchcombe, St Mary's York. Of these the precedence was originally yielded to the Abbot of Glastonbury, until in A.D. 1154 Adrian IV. (Nicholas Breakspear) granted it to the Abbot of St Alban's, in which monastery he had been brought up. Next after the Abbot of St Alban's ranked the Abbot of Westminster.

To distinguish abbots from bishops, it was ordained that their mitre should be made of less costly materials, and should not be ornamented with gold, a rule which was soon entirely disregarded, and that the crook of their pastoral staff should turn inwards instead of outwards, indicating that their jurisdiction was limited to their own house. The adoption of episcopal insignia by abbots was followed by an encroachment on episcopal functions, which had to be specially but ineffectually guarded against by the Lateran Council, A.D. 1123. In the East, abbots,

if in priests' orders, with the consent of the bishop, were, as we have seen, permitted by the Second Nicene Council, A.D. 787, to confer the tonsure and admit to the order of reader; but they gradually advanced higher claims, until we find them authorised by Bellarmine to be associated with a single bishop in episcopal consecrations, and permitted by Innocent IV., A.D. 1489, to confer both the subdiaconate and diaconate. Of course, they always and everywhere had the power of admitting their own monks, and vesting them with the religious habit. In the first instance, when a vacancy occurred, the bishop of the diocese chose the abbot out of the monks of the convent, but the right of election was transferred by jurisdiction to the monks themselves, reserving to the bishop the confirmation of the election and the benediction of the new abbot. In abbeys exempt from episcopal jurisdiction, the confirmation and benediction had to be conferred by the Pope in person, the house being taxed with the expenses of the new abbot's journey to Rome. By the rule of St Benedict, the consent of the laity was in some undefined way required; but this seems never to have been practically enforced. It was necessary that an abbot should be at least 25 years of age, of legitimate birth, a monk of the house, unless it furnished no suitable candidate, when a liberty was allowed of electing from another convent, well instructed himself, and able to instruct others, one also who had learned how to command by having practised obedience. In some exceptional cases an abbot was allowed to name his own successor. Cassian speaks of an abbot in Egypt doing this; and in later times we have another example in the case of St Bruno. Popes and sovereigns gradually encroached on the rights of the monks, until in Italy the Pope had usurped the nomination of all abbots, and the king in France, with the exception of Clugny, Prémontré, and other houses, chiefs of their order. The election was for life, unless the abbot was canonically deprived by the chiefs of his order, or, when he was directly subject to them, by the Pope or the bishop.

The ceremony of the formal admission of a Benedictine abbot in mediæval times is thus prescribed by the customary of Abingdon. The newly elected abbot was to put off his shoes at the door of the church, and proceed barefoot to meet the members of the house advancing in a procession. After proceeding up the nave, he was to kneel and pray at the topmost step of the entrance of the choir, into which he was to be introduced by the bishop or his commissary, and placed in his stall. The monks, then kneeling, gave him the kiss of peace on the hand, and rising, on the mouth, the abbot holding his staff of office. He then put on his shoes in the vestry, and a chapter was held, and the bishop or his commissary preached a suitable sermon.

The power of the abbot was paternal but absolute, limited, however, by the canons of the church, and, until the general establishment of exemptions, by episcopal control. As a rule, however, implicit obedience was enforced; to act without his orders was culpable; while it was a sacred duty to execute his orders, however unreasonable, until they were withdrawn. Examples among the Egyptian monks of this blind submission to the commands of the superiors, exalted into a virtue by those who regarded the entire crushing of the individual will as the highest excellence, are detailed by Cassian and others,—e.g., a monk watering a dry stick, day after day, for months, or endeavouring to remove a huge rock immensely exceeding his powers. St Jerome, indeed, lays down, as the principle of the compact between the abbot and his monks, that they should obey their superiors in all things, and perform whatever they commanded.—(Ep. 2, ad Eustoch. de custod,

virgin.) So despotic did the tyranny become in the West, that in the time of Charlemagne it was necessary to restrain abbots by legal enactments from mutilating their monks, and putting out their eyes; while the rule of St Columba ordained 100 lashes as the punishment for very slight offences. An abbot also had the power of excommunicating refractory nuns, which he might use if desired by their abbess.

The abbot was treated with the utmost submission and reverence by the brethren of his house. When he appeared either in church or chapter all present rose and bowed. His letters were received kneeling, like those of the Pope and the king. If he gave a command, the monk receiving it was also to kneel. No monk might sit in his presence, or leave it without his permission. The highest place was naturally assigned to him, both in church and at table. In the East he was commanded to eat with the other monks. In the West the rule of St Benedict appointed him a separate table, at which he might entertain guests and strangers. This permission opening the door to luxurious living, the Council of Aix, A.D. 817, decreed that the abbot should dine in the refectory, and be content with the ordinary fare of the monks, unless he had to entertain a guest. These ordinances proved, however, generally ineffectual to secure strictness of diet, and contemporaneous literature abounds with satirical remarks and complaints concerning the inordinate extravagance of the tables of the abbots. When the abbot condescended to dine in the refectory, his chaplains waited upon him with the dishes, a servant, if necessary, assisting them. At St Alban's the abbot took the lord's seat, in the centre of the high table, and was served on silver plate, and sumptuously entertained noblemen, ambassadors, and strangers of quality. When abbots dined in their own private hall, the rule of St Benedict charged them to invite their monks to their table, provided there was room, on which occasions the guests were to abstain from quarrels, slanderous talk, and idle gossiping. The complaint, however, was sometimes made (as by Matt. Paris of Wulsig, the third abbot of St Alban's), that they invited ladies of rank to dine with them instead of their monks. The ordinary attire of the abbot was according to rule to be the same as that of the monks. But by the 10th century the rule was commonly set aside, and we find frequent complaints of abbots dressing in silk, and adopting great sumptuousness of attire. Nay, they sometimes laid aside the monastic habit altogether, and assumed a secular dress.<sup>1</sup> This was a necessary consequence of their following the chase, which was quite usual, and indeed at that time only natural. With the increase of wealth and power, abbots had lost much of their special religious character, and become great lords, chiefly distinguished from lay lords by celibacy. Thus we hear of abbots going out to sport, with their men carrying bows and arrows; keeping horses, dogs, and huntsmen; and special mention is made of an abbot of Leicester, *cir.* 1360, who was the most skilled of all the nobility in hare-hunting. In magnificence of equipage and retinue the abbots vied with the first nobles of the realm. They rode on mules with gilded bridles, rich saddles and housings, carrying hawks on their wrist, attended by an immense train of attendants. The bells of the churches were rung as they passed. They associated on equal terms with laymen of the highest distinction, and shared all their pleasures and pursuits. This rank and power was, however, often used most beneficially. For instance, we read of Whiting, the last Abbot of Glastonbury, judicially murdered by Henry VIII., that his house was a kind of well-ordered court, where as many as 300 sons of noblemen and

gentlemen, who had been sent to him for virtuous education, had been brought up, besides others of a meaner rank, whom he fitted for the universities. His table, attendance, and officers were an honour to the nation. He would entertain as many as 500 persons of rank at one time, besides relieving the poor of the vicinity twice a-week. He had his country houses and fisheries, and when he travelled to attend Parliament his retinue amounted to upwards of 100 persons. The abbots of Clugny and Vendome were, by virtue of their office, cardinals of the Romish Church.

In process of time the title abbot was improperly transferred to clerics who had no connection with the monastic system, as to the principal of a body of parochial clergy; and under the Carolingians to the chief chaplain of the king, *Abbas Curie*, or military chaplain of the emperor, *Abbas Castrensis*. It even came to be adopted by purely secular officials. Thus the chief magistrate of the republic at Genoa was called *Abbas Populi*. Ducange, in his Glossary, also gives us *Abbas Campanie*, *Clocherii*, *Palatii*, *Scholaris*, &c.

*Lay abbots*, so called, had their origin in the system of *commendation*, in the 8th century. By this, to meet any great necessity of the state, such as an inroad of the Saracens, the revenues of monasteries were temporarily commended, *i.e.*, handed over to some layman, a noble, or even the king himself, who for the time became titular abbot. Enough was reserved to maintain the monastic brotherhood, and when the occasion passed away the revenues were to be restored to their rightful owners. The estates, however, had a habit of lingering in lay hands, so that in the 9th and 10th centuries most of the sovereigns and nobles among the Franks and Burgundians were titular abbots of some great monastery, the revenues of which they applied to their own purposes. These lay-abbots were styled *Abbascomites* or *Abbatcs Milites*. Hugh Capet, before his elevation to the throne, as an *Abbascomes* held the abbey of St Denis and St Germain in *commendam*. Bishop Hatto, of Mentz, A.D. 891-912, is said to have held 12 abbey in *commendam* at once. In England, as we see from the Acts of the Council of Cloveshoe, in the 8th century, monasteries were often invaded and occupied by laymen. This occurred sometimes from the monastery having voluntarily placed itself under the protection of a powerful layman, who, from its protector, became its oppressor. Sometimes there were two lines of abbots, one of laymen enjoying the lion's share of the revenues, another of clerics fulfilling the proper duties of an abbot on a small fraction of the income. The gross abuse of lay commendation which had sprung up during the corruption of the monastic system passed away with its reformation in the 10th century, either voluntarily or by compulsion. The like abuse prevailed in the East at a later period. John, Patriarch of Antioch, at the beginning of the 12th century, informs us that in his time most monasteries had been handed over to laymen, *beneficiarii*, for life, or for part of their lives, by the emperors.

In conventual cathedrals, where the bishop occupied the place of the abbot, the functions usually devolving on the superior of the monastery were performed by a *prior*. In other convents the prior was the second officer next to the abbot, representing him in his absence, and fulfilling his duties. The superiors of the cells, or small monastic establishments dependent on the larger monasteries, were also called priors. They were appointed by the abbots, and held office at their pleasure.

*Authorities*:—Bingham, *Origines*; Ducange, *Glossary*; Herzog, *Realwörterbuch*; Robertson, *Ch. Hist.*; Martene, *De Antiq. Monast. Ritibus*, Montalembert, *Monks of the West* (E. V.)

<sup>1</sup> Walworth, the fourth abbot of St Alban's, *circa* 930, is charged by Matthew Paris with adopting the attire of a sportsman.



ABBOT, CHARLES, speaker of the House of Commons from 1802 to 1817, afterwards created Lord Colchester. See COLCHESTER.

ABBOT, GEORGE, Archbishop of Canterbury, was born October 19, 1562, at Guildford in Surrey, where his father was a cloth-worker. He studied at Balliol College, Oxford, and was chosen Master of University College in 1597. He was three times appointed to the office of Vice-Chancellor of the University. When in 1604 the version of the Bible now in use was ordered to be prepared, Dr Abbot's name stood second on the list of the eight Oxford divines to whom was intrusted the translation of the New Testament, excepting the Epistles. In 1608 he went to Scotland with the Earl of Dunbar to arrange for a union between the Churches of England and Scotland, and his conduct in that negotiation laid the foundation of his preferment, by attracting to him the notice and favour of the king. Without having held any parochial charge, he was appointed Bishop of Lichfield and Coventry in 1609, was translated to the see of London a month afterwards, and in less than a year was made Archbishop of Canterbury. This rapid preferment was due as much perhaps to his flattering his royal master as to his legitimate merits. After his elevation he showed on several occasions firmness and courage in resisting the king. In the scandalous divorce suit of the Lady Frances Howard against the Earl of Essex, the archbishop persistently opposed the dissolution of the marriage, though the influence of the king and court was strongly and successfully exerted in the opposite direction. In 1618, when a declaration was published by the king, and ordered to be read in all the churches, permitting sports and pastimes on the Sabbath, Abbot had the courage to forbid its being read at Croydon, where he happened to be at the time. As may be inferred from the incident just mentioned, Abbot was of the Protestant or Puritan party in the Church. He was naturally, therefore, a promoter of the match between the Elector Palatine and the Princess Elizabeth, and a firm opponent of the projected marriage of the Prince of Wales with the Infanta of Spain. This policy brought upon him the hatred of Laud and the court. The king, indeed, never forsook him; but Buckingham was his avowed enemy, and he was regarded with dislike by the Prince of Wales, afterwards Charles I. In 1622 a sad misfortune befell the archbishop while hunting in Lord Zouch's park at Bramzell. A bolt from his cross-bow aimed at a deer happened to strike one of the keepers, who died within an hour, and Abbot was so greatly distressed by the event that he fell into a state of settled melancholy. His enemies maintained that the fatal issue of this accident disqualified him for his office, and argued that, though the homicide was involuntary, the sport of hunting which had led to it was one in which no clerical person could lawfully indulge. The king had to refer the matter to a commission of ten, though he said that "an angel might have miscarried after this sort." A decision was given in the archbishop's favour; but to prevent disputes, it was recommended that the king should formally absolve him, and confer his office upon him anew. After this the archbishop seldom appeared at the council, chiefly on account of his infirmities. He attended the king constantly, however, in his last illness, and performed the ceremony of the coronation of Charles I. A pretext was soon found by his enemies for depriving him of all his functions as primate, which were put in commission by the king. This high-handed procedure was the result of Abbot's refusal to license a sermon preached by Dr Sibthorp, in which the king's prerogative was stretched beyond constitutional limits. The archbishop had his powers restored to him shortly afterwards, however, when the king found it absolutely necessary to summon a Parliament. His pre-

sence being unwelcome at court, he lived from that time in retirement, leaving Laud and his party in undisputed ascendancy. He died at Croydon on the 5th August 1633, and was buried at Guildford, his native place, where he had endowed an hospital with lands to the value of £300 a year. Abbot wrote a large number of works; but, with the exception of his *Exposition on the Prophet Jonah* (1600), which was reprinted in 1845, they are now little known. His *Geography*, or a *Brief Description of the Whole World*, passed through numerous editions.

ABBOT, GEORGE, known as "The Puritan," has been oddly and persistently mistaken for others. He has been described as a clergyman, which he never was, and as son of Sir Morris Abbot, and his writings accordingly entered in the bibliographical authorities as by the nephew of the Archbishop of Canterbury. One of the sons of Sir Morris Abbot was, indeed, named George, and he was a man of mark, but the more famous George Abbot was of a different family altogether. He was son or grandson (it is not clear which) of Sir Thomas Abbot, knight of Easington, East Yorkshire, having been born there in 1603-4, his mother (or grandmother) being of the ancient house of Pickering. He married a daughter of Colonel Purefoy of Caldecote, Warwickshire, and as his monument, which may still be seen in the church there, tells, he bravely held it against Prince Rupert and Maurice during the civil war. He was a member of the Long Parliament for Tamworth. As a layman, and nevertheless a theologian and scholar of rare ripeness and critical ability, he holds an almost unique place in the literature of the period. His *Whole Booke of Job Paraphrased, or made easy for any to understand* (1640, 4to), is in striking contrast, in its concinnity and terseness, with the prolixity of too many of the Puritan expositors and commentators. His *Kindike Sabbathi* (1641, 8vo) had a profound and lasting influence in the long Sabbatic controversy. His *Brief Notes upon the Whole Booke of Psalms* (1651, 4to), as its date shows, was posthumous. He died February 2, 1648. (MS. collections at Abbeyville for history of all of the name of Abbot, by J. T. Abbot, Esq., F.S.A., Darlington; Dugdale's *Antiquities of Warwickshire*, 1656, p. 791; Wood's *Athenæ* (Bliss), s. v.; Cox's *Literature of the Sabbath*; Dr James Gilliland on *The Sabbath*; *Lovvades, Bodleian, B. Museum Catal.* s. v.) (A. B. G.)

ABBOT, ROBERT. Noted as this Puritan divine was in his own time, and representative in various ways, he has hitherto been confounded with others, as Robert Abbot, Bishop of Salisbury, and his personality distributed over a Robert Abbot of Cranbrook; another of Southwick, Hants; a third of St Austin's, London; while these successive places were only the successive livings of the one Robert Abbot. He is also described as of the Archbishop's or Guildford Abbots, whereas he was in no way related, albeit he acknowledges very gratefully, in the first of his epistles-dedicatory of *A Hand of Fellowship to Helpe Keepe out Sinne and Antichrist* (1623, 4to), that it was from the archbishop he had "received all" his "worldly maintenance," as well as "best earthly countenance" and "fatherly encouragements." The worldly maintenance was the presentation to the vicarage of Cranbrook in Kent, of which the archbishop was patron. This was in 1616. He had received his education at Cambridge, where he proceeded M.A., and was afterwards incorporated at Oxford. In 1639, in the epistle to the reader of his most noticeable book historically, his *Triall of our Church-Forsakers*, he tells us, "I have lived now, by God's gracious dispensation, above fifty years, and in the place of my allotment two and twenty full." The former date carries us back to 1588-89, or perhaps 1587-88—the

"Armada" year—as his birth-time; the latter to 1616–17 (*ut supra*). In his *Bee Thankfull London and her Sisters* (1626), he describes himself as formerly "assistant to a reverend divine . . . now with God," and the name on the margin is "Master Haiward of Wool Church." This was doubtless previous to his going to Cranbrook. Very remarkable and effective was Abbot's ministry at Cranbrook, where the father of Phineas and Giles Fletcher was the first "Reformation" pastor, and which, relatively small as it is, is transfigured by being the birth-place of the poet of the "Locustæ" and "The Purple Island." His parishioners were as his own "sons and daughters" to him, and by day and night he thought and felt, wept and prayed, for them and with them. He is a noble specimen of the rural clergyman of his age. Puritan though he was in his deepest convictions, he was a thorough Churchman as toward Non-conformists, *e.g.*, the Brownists, with whom he waged stern warfare. He remained until 1643 at Cranbrook, and then chose the very inferior living of Southwick, Hants, as between the one and the other, the Parliament deciding against pluralities of ecclesiastical offices. Succeeding the "extruded" Udall of St Austine's, Abbot continued there until a good old age. In 1657, in the *Warning-piece*, he is described as still "pastor of Austine's in London." He disappears silently between 1657–8 and 1662. Robert Abbot's books are distinguished from many of the Puritans by their terseness and variety. (*Brook's Puritans*, iii. 182, 3; *Walker's Sufferings*; *Wood's Athenæ* (Bliss); *Catalogus Impressorum Librorum in Bibliotheca Bodleiana*, s.v.; *Palmer's Nonconf. Mem.*, ii. 218.) (A. B. G.)

ABBOTSFORD, the celebrated residence of Sir Walter Scott, situated on the south bank of the river Tweed, about three miles above Melrose. The nucleus of the property was a small farm of 100 acres, with the "inharmonious designation" of Clarty Hole, acquired by Scott on the lapse of his lease (1811) of the neighbouring house of Ashestiel. It was gradually increased by various acquisitions, the last and principal being that of Toffield (afterwards named Huntlyburn), purchased in 1817. The present new house was then commenced, and was completed in 1824. The general ground-plan is a parallelogram, with irregular outlines—one side overlooking the Tweed, and the other facing a courtyard; and the general style of the building is the Scottish baronial. Scott had only enjoyed his new residence one year when (1825) he met with that reverse of fortune (connected with the failure of Ballantyne and Constable), which involved the estate in debt. In 1830, the library<sup>1</sup> and museum were presented as a free gift by the creditors; and after Scott's death, which took place at Abbotsford in September 1832, a committee of friends subscribed a further sum of about £8000 towards the same object. The property was wholly disencumbered in 1847, by Mr Cadell, the publisher, accepting the remaining claims of the family over Sir Walter Scott's writings in requital of his obligation to obliterate the heritable bond on the property. The result of this transaction was, that not only was the estate redeemed by the fruit of Scott's brain, but a handsome residue fell to the publisher. Scott's only son Walter (Lieutenant-Colonel 15th Hussars) did not live to enjoy the property, having died on his way from India in 1847. Its subsequent possessors have been Scott's son-in-law, J. G. Lockhart, and the latter's son-in-law, J. R. Hope Scott, Q.C., whose daughter (Scott's great-granddaughter) is the present proprietor. Mr Lockhart died at Abbotsford in 1854.—See *Life of Scott*, by J. G. Lockhart; *Abbotsford and Newstead Abbey*, by Washington Irving; *Abbotsford Notanda in Gentleman's Mag.*,

April and May 1869; *The Lands of Scott*, by James F. Hunnewell, cr. 8vo, 1871; *Scott Loan Exhibition Catalogue*, 4to, 1871.

ABBOTSFORD CLUB, one of the principal printing clubs, was founded in 1834 by Mr W. B. D. D. Turnbull, and named in honour of Sir Walter Scott. Taking a wider range than its predecessors, the Bannatyne and Maitland Clubs, it did not confine its printing (as remarked by Mr Lockhart) to works connected with Scotland, but admitted all materials that threw light on the ancient history of literature of any country, anywhere described or discussed by the Author of Waverley. The club, now dissolved, consisted of fifty members; and the publications extend to 31 vols. quarto, issued during the years 1835–1864.

ABBREVIATION, a letter or group of letters, taken from a word or words, and employed to represent them for the sake of brevity. Abbreviations, both of single words and of phrases, having a meaning more or less fixed and recognised, are common in ancient writings and inscriptions, and very many are in use at the present time. A distinction is to be observed between abbreviations and the contractions that are frequently to be met with in old manuscripts, and even in early printed books, whereby letters are dropped out here and there, or particular collocations of letters represented by somewhat arbitrary symbols. The commonest form of abbreviation is the substitution for a word of its initial letter; but, with a view to prevent ambiguity, one or more of the other letters are frequently added. Letters are often doubled to indicate a plural or a superlative.

I. CLASSICAL ABBREVIATIONS.—The following list contains a selection from the abbreviations that occur in the writings and inscriptions of the Romans:—

- A.  
A. Absolvo, Edilis, Æs, Ager, Ago, Aio, Amicus, Annus, Antiquo, Auctor, Auditor, Augustus, Aulus, Aurum, Aut.  
A.A. Æs alienum, Ante audita, Apud agrum, Aurum argentum.  
A.A. Augusti, A.A.A. Augusti tres.  
A.A.A.F.F. Auro argento are dando feriundo.<sup>1</sup>  
A.A.V. Alter ambo.  
A.C. Acta causa, Alius civis.  
A.D. Ante diem; *e.g.*, A.D.V. Ante diem quintum.  
A.D.A. Ad dandos agros.  
ÆD. Edes, Edilis, Edilitas.  
ÆM. and A.M. Æmilii, Æmilia.  
ÆR. Ærarium. ÆR.P. Ære publica.  
A.F. Actum fide, Auli filius.  
A.G. Ager, Ago, Agrippa.  
A.G. Animo grato, Aulus Gellius.  
A.L.Æ and A.L.E. Arbitrium litis estimando.  
A.M. and A.M.L. Ad milliarium.  
A.N. Aniensiis, Annus, Ante.  
A.N.N. Annales, Anni, Annona.  
A.N.T. Ante, Antonius.  
A.O. Alii omnes, Amico optimo.  
A.P. Applus, Apud.  
A.P. Ad pedes, Edilitia potestate.  
A.P.F. Auro (or argento) publico feriundo.  
A.P.M. Amico posuit monumentum, Annorum plus minus.  
A.P.R.C. Anno post Romam conditam.  
A.R.G. Argentum.  
A.R.V.V.D.D. Aram votam volens dedicavit, Arma votiva dono dedit.  
A.T. A tergo. Also A.T.E. and A.T.E.  
A.T.M.D.O. Aio te mihi dare opertera.  
A.V. Angur, Augustus, Aurelius.  
A.V. Annos vixit.  
A.V.C. Ab urbe condita.  
A.V.G. Angur, Augustus.  
A.V.G. Augusti (generally of two). AVGGG. Augusti tres.  
A.V.T.P.R.R. Auctoritas provincie Romanorum.

- B.  
B. Balbins, Balbus, Beatus, Bene, Beneficiarius, Beneficium, Bonus, Brutus, Bustum.  
B. for V. Berna, Bivus, Bixit.  
B.A. Bixit annos, Bonus auguriis, Bonus amabilia.

<sup>1</sup> The Catalogue of the Library at Abbotsford forms vol. lxi. of the Bannatyne Club publications.

<sup>1</sup> Describing the function of the *triumviri monetales*.



BB. or B.B. Bene bene, i.e., optime, Optimus.

B.D. Bonae dæ, Bonum datum.

B.DD. Bonis deabus.

B.D.S.M. Bene de se merenti.

B.F. Bona femina, Bona fides, Bona fortuna, Bonum factum.

B.F. Bona femina, Bona filia.

B.H. Bona hereditaria, Bonorum heres.

B.I. Bonum iudicium. B.I.I. Boni iudicis iudicium.

B.M. Beate memorie, Bene merenti.

B.N. Bona nostra, Bonum nomen.

B.N.H.I. Bona hic invenies.

B.P. Bona paternæ, Bonorum potestas, Bonum publicum.

B.Q. Bene quiescat, Bona quesita.

B.R.P.N. Bono reipublicæ natæ.

BET. Britannicus.

B.T. Bonorum tutor, Brevi tempore.

B.V. Bene vale, Bene vixit, Bonus vir.

B.V.V. Balnea vina Venus.

BX. Bixit, for vixit.

C.

CI. Cæsar, Caius, Caput, Causa, Censor, Civis, Cohors, Colonia, Comitialis (dies), Condemno, Consul, Cum, Curo, Custos.

Q. Caia, Centuria, Cum, the prefix Con.

C.B. Civis bonus, Commune bonum, Coniugi benemerenti, Cui bono.

C.C. Calumnias causa, Causa cognita, Coniugi carissimæ, Conalium cepit, Curis consulto.

C.C.C. Calumnias cavenda causâ.

C.C.F. Cæsar (or Caius) curavit faciendum, Caius Cæli filius.

CC.VV. Clarissimi viri.

C.D. Cæsaris decreto, Caius Decius, Comitibus diebus.

CES. Censor, Censores, CESS. Censores

C.F. Causa fiducia, Coniugi fecit, Curavit faciendum.

C.H. Custos heredium, Custos hortorum.

C.I. Caius Julius, Consul iussit, Curavit iudex.

CI. Clarissimus, Claudius, Clodius, Colonia.

CL.V. Clarissimus vir, Clypeum vocit.

C.M. Caius Marius, Causa mortis.

CN. Cnæus.

COH. Cohæres, Cohors.

COL. Collega, Collegium, Colonia, Columna.

COLL. Collega, Coloni, Colonia.

COM. Comes, Comitium, Comparatum.

CON. Coniux, Consensus, Consiliarius, Consul, Consularis.

COR. Cornelia (tribus), Cornelius, Corona, Corpus.

COS. Consiliarius, Consul, Consulares. COSS. Consules.

C.P. Carissimus or Clarissimus puer, Civis publicus, Curavit ponendum.

C.R. Caius Rufus, Civis Romanus, Curavit reficiendum.

CS. Cæsar, Communia, Consul.

C.V. Clarissimus or consularis vir.

CVR. Cura, Curator, Curavit, Curia.

D.

D. Dat, Dedit, &c., De, Decimus, Decius, Decretum, Decurio, Deus, Dicit, &c., Dies, Divus, Dominus, Domus, Donum.

D.C. Decurio colonie, Diebus comitalibus, Divus Cæsar.

D.D. Dea Dia, Decurionum decreto, Dedicavit, Deo dedit, Dono dedit.

D.D.D. Datum decreto decurionum, Dono dedit dedicavit.

D.E.R. De ea re.

DES. Designatus.

D.I. Dedit imperator, Diis immortalibus, Diis inferis.

D.I.M. Deo invicto Mithra, Diis inferis Manibus.

D.M. Deo Magno, Dignus memoria, Diis Manibus, Dolo malo.

D.O.M. Deo Optimo Maximo.

D.P.S. Dedit proprio sumptu, Deo perpetuo sacrum, De pecunia sua.

E.

E. Ejus, Eques, Erexit, Ergo, Est, Et, Etiam, Ex.

EG. Eger, Egit, Egredius.

E.M. Egregie memorie, Ejusmodi, Erexit monumentum.

E.Q.M. Equitum magister.

E.R.A. Ea res agitur.

F.

F. Fabius, Facere, Fecit, &c., Familia, Fastus (dies), Felix, Femina, Fides, Filius, Flamen, Fortuna, Frater, Fuit, Functus.

F.C. Faciendum curavit, Fidei commissum, Fiducia causæ.

F.D. Fidem dedit, Flamen Dialis, Fraude donavit.

F.F.F. Ferro flamma fame, Fortia, Fortuna fato.

FL. Filius, Flamen, Flaminius, Flavius.

F.L. Favete linguis, Fecit libens, Felix liber.

F.R. Forum, Fronte, Frumentarius.

F.R. Forum Romanum.

G.

G. Gaius (= Cains), Gallia, Gaudium, Gellius, Gemina, Gens, Gesta, Gratia.

G.F. Gemina fidelis (applied to a legion). So G.P.F. Gemina pia fidelis.

GL. Gloria.

GN. Genius, Gens, Genus, Gnæus (= Cnæus).

G.P.R. Genio populi Romani.

H.

H. Habet, Hares, Hic, Homo, Honor, Hora.

HER. Hæres, Herennius. HER. and HERC. Hercules.

H.L. Hæc lege, Hæc loco, Honestæ loco.

H.M. Hæc monumentum, Honestæ mulier, Hora mala.

H.S.E. Hic sepultus est, Hic situs est.

H.V. Hæc urbs, Hic vivit, Honestæ vixit, Honestus vir.

I.

I. Immortalis, Imperator, In, Infra, Inter, Invictus, Ipse, Isis, Iudex, Julius, Junius, Jupiter, Justus.

IA. Jam, Intra.

I.C. Julius Cæsar, Juris Consultum, Jus civile.

ID. Idem, Idus, Interdum.

I.D. Inferi dii, Jovi dedicatum, Jus dicendum, Jussu Dei.

I.D.M. Jovi deo magno.

I.F. In foro, In fronte.

I.H. Jacet hic, In honestatem, Justus homo.

IM. Imago, Immortalis, Immunis, Impensa.

IMP. Imperator, Imperium.

I.O.M. Jovi optimo maximo.

I.P. In publico, Intra provinciam Justa persona.

I.S.V.P. Impensa sua vivus posuit.

K.

K. Kæso, Caia, Calumnias, Caput, Carus, Castra.

K., KAL., and KL. Kalendæ.

L.

L. Lælius, Legio, Lex, Libens Libër, Libra, Locus, Lollius.

LB. Libens, Liberi, Libertus.

L.D.D.D. Locus datus decreto decurionum.

LEG. Legatus, Legio.

LIB. Libër, Liberalitas, Libertas, Libertus, Librarius.

LL. Leges, Libertissime, Liberti.

L.M. Libens merito, Locus monumenti.

I.S. Laribus sacrum, Libens solvit, Locus sacer.

LVD. Ludus.

L.V.P.F. Ludos publicos fecit.

M.

M. Magister, Magistratus, Magnus, Manes, Marcus, Marius, Marti, Mater, Memoria, Mensis, Miles, Monumentum, Mortuus, Mucius, Mulier.

M'. Manius.

M.D. Magno Deo, Manibus diis, Matri deum, Merenti dedit.

MES. Mensis. MESS. Mensos.

M.F. Mala fides, Marci filius, Monumentum fecit.

M.I. Matri Idaeæ, Matri Isidi, Maximo Jovi.

MNT. and MON. Moneta.

M.P. Male positus, Monumentum posuit.

M.S. Manibus sacrum, Memoriae sacrum, Manuscriptum.

MVN. Municeps, or municipium; so also MN., M.V., and MVNIC.

M.V.S. Marti ultiori sacrum, Merito votum solvit.

N.

N. Natio, Natus, Nefastus (dies), Nepos, Neptunus, Nero, Nomen, Non, Nona, Noster, Novus, Numen, Numerus, Numerus, Nummus.

NFP. Nepos, Neptunus.

N.F.C. Nostra fidei commissum.

N.L. Non licet, Non liquet, Non longe.

N.M.V. Nobilis memorie vir.

NN. Nostri. NN., NNO., and NNR. Nostorum.

NOB. Nobilis. NOB., NOBR., and NOV. Novembria.

N.P. Nefastus primo (i.e., priore parte diei), Non potest.

O.

O. Ob, Officium, Omnis, Oportet, Optimus, Opus, Ossa.

OB. Obiit, Obiter, Orbis.

O.C.S. Ob civis servatos.

O.H.F. Omnibus honoribus functus.

O.H.S.S. Ossa hic sita sunt.

OR. Oras, Ordo, Ornametum.

O.T.B.O. Ossa tua bene quiescant.

P.

P. Pars, Passus, Pater, Patronus, Pax, Perpetuus, Pes, Pius, Plebs, Pondo, Populus, Post, Posuit, Præses, Prætor, Primus, Pro, Provincia, Publicus, Publicus, Puer.

P.C. Pactum conventum, Patres conscripti, Pecunia constituta, Ponendum curavit, Post consulatum, Potestate censoria.

|        |                                                                                   |
|--------|-----------------------------------------------------------------------------------|
| P.F.   | Pia fidelis, Plus felix, Promissa fides, Publii filius.                           |
| P.M.   | Pis memoris, Plus minus, Pontifex maximus.                                        |
| P.P.   | Pater patratus, Pater patriæ, Pecunia publica, Præpositus, Primpilius, Proprætor. |
| PR.    | Præses, Prætor, Pridie, Princeps.                                                 |
| P.R.   | Permissu reipublicæ, Populus Romanus.                                             |
| P.R.C. | Post Romam conditam.                                                              |
| PR.PR. | Præfectus prætorii, Proprætor.                                                    |
| P. S.  | Pecunia sua, Plebiscitum, Proprio sumptu, Publicæ salutis.                        |
| P.V.   | Pia victrix, Præfectus urbi, Præstantissimus vir.                                 |

|          |                                                                      |
|----------|----------------------------------------------------------------------|
| Q.       | Quæstor, Quando, Quantum, Que: Qui, Quinquennalis, Quintus, Quiritæ. |
| Q.D.R.   | Qua de re.                                                           |
| Q.I.S.S. | Quæ infra scripta sunt; <i>so</i> Q. S. S. S. Quæ supra. &c.         |
| QQ.      | Quæcunque, Quinquennalis, Quoque.                                    |
| Q.R.     | Quæstor reipublicæ.                                                  |

|                  |                                                                         |
|------------------|-------------------------------------------------------------------------|
| R.               | Recta, Res. Respublica, Retro, Rex, Ripa, Roma, Romanus, Rufus, Rursus. |
| R.C.             | Romana civitas, Romanus civis.                                          |
| RESP. and R.P.   | Respublica.                                                             |
| RET. P. and R.P. | Retro pedes.                                                            |

|    |                                                                                                                 |
|----|-----------------------------------------------------------------------------------------------------------------|
| S. | Sacrum, Scriptus, Semis, Senatus, Sepultus, Servus, Servus, Sextus Sibi, Sine, Situs, Solus, Solvit, Sub, Suis. |
|----|-----------------------------------------------------------------------------------------------------------------|

|      |                                                                |
|------|----------------------------------------------------------------|
| SAC. | Sacerdos, Sacrificium, Sacrum.                                 |
| S.C. | Senatus consultum.                                             |
| S.D. | Sacrum diis, Salutem dicit, Senatus decreto, Sententiam dedit. |

|              |                                                |
|--------------|------------------------------------------------|
| S.D.M.       | Sacrum diis Manibus, Sine dolo malo.           |
| SEK.         | Servius, Servus.                               |
| S.E.T.L.     | Sit ei terra levis.                            |
| SN.          | Senatus, Sententia, Sine.                      |
| S.P.         | Sacerdos perpetuus, Sine pecunia, Sua pecunia. |
| S.P.Q.R.     | Senatus populusque Romanus.                    |
| S.S.         | Sanctissimus senatus, Supra scriptum.          |
| S.V.B.E.Q.V. | Si vales bene est, ego quidem valeo.           |

|                   |                                                               |
|-------------------|---------------------------------------------------------------|
| T.                | Terminus, Testamentum, Titus, Tribunus, Tu, Turma, Tutor.     |
| TB, TI, and TIB.  | Tiberius.                                                     |
| TR, TR., and TRB. | Tribunus.                                                     |
| T.F.              | Testamentum fecit, Titi filius, Titulum fecit, Titus Flavius. |
| TM.               | Terminus, Testamentum, Therma.                                |
| T.P.              | Terminus posuit, Tribunicia potestate, Tribunus plebis.       |
| TVL.              | Tullius, Tullus.                                              |

|      |                                                                                  |
|------|----------------------------------------------------------------------------------|
| V.   | Urbs, Usus, Uxor, Vale, Verba, Vestalia, Vester, Vir, Vivus, Vixit, Volo, Votum. |
| V.A. | Veterano assignatus, Vixit annos.                                                |
| V.C. | Vale conjux, Vir clarissimus, Vir consularis.                                    |
| V.E. | Verum etiam, Vir egregius, Visum est.                                            |
| V.F. | Usus fructus, Verba fecit, Vivus fecit.                                          |
| V.P. | Urbis præfectus, Vir perfectissimus, Vivus posuit.                               |
| V.R. | Urbs Roma, Uti rogas, Votum reddidit.                                            |

II. MEDIEVAL ABBREVIATIONS.—Of the different kinds of abbreviations in use in the middle ages, the following are examples:—

|              |                                                                 |
|--------------|-----------------------------------------------------------------|
| A.M.         | Ave Maria.                                                      |
| B.P.         | Beatus Paulus, Beatus Petrus.                                   |
| CC.          | Carissimus ( <i>also plur.</i> Carissimi), Clarissimus, Circum. |
| D.           | Deus, Dominicus, Dux.                                           |
| D.N.PP.      | Dominus noster Papa.                                            |
| FE.          | Felicissimus, Fratres, Pandectæ ( <i>prob. for Gr. M.</i> ).    |
| I.C. or I.X. | Jesus Christus.                                                 |
| I.D.N.       | In Dei nomine.                                                  |
| KK.          | Karissimus ( <i>or -mli</i> ).                                  |
| MM.          | Magistri, Martyres, Matrimonium, Meritissimus.                  |
| O.S.B.       | Ordinis Sancti Benedicti.                                       |
| PP.          | Papa, Patres, Pissimus.                                         |
| R.F.         | Rex Francorum.                                                  |
| R.P.D.       | Reverendissimus Pater Dominus.                                  |
| S.C.M.       | Sacra Cæsarea Majestas.                                         |
| S.M.F.       | Sancta Mater Ecclesia.                                          |
| S.M.M.       | Sancta Mater Maria.                                             |
| S.R.I.       | Sanctum Romanum Imperium.                                       |
| S.V.         | Sanctitas Vestra, Sancta Virgo.                                 |
| V.           | Venerabilis, Venerandus.                                        |
| V.R.P.       | Vestra Reverendissima Paternitas.                               |

III. ABBREVIATIONS NOW IN USE.—The import of these will often be readily understood from the connection in

which they occur. There is no occasion to explain here the common abbreviations used for Christian names, books of Scripture, months of the year, points of the compass, grammatical and mathematical terms, or familiar titles, like "Mr," &c.

The ordinary abbreviations, now or recently in use, may be conveniently classified under the following headings:—

#### 1. ABBREVIATED TITLES AND DESIGNATIONS

|              |                                                                   |
|--------------|-------------------------------------------------------------------|
| A.A.         | Associate of Arts.                                                |
| A.B.         | Able-bodied seaman.                                               |
| A.M.         | ( <i>Artium Magister</i> ), Master of Arts.                       |
| A.R.A.       | Associate of the Royal Academy.                                   |
| A.R.S.A.     | Associate of the Royal Scottish Academy.                          |
| B.A.         | Bachelor of Arts.                                                 |
| B.C.L.       | Bachelor of Civil Law.                                            |
| B.D.         | Bachelor of Divinity.                                             |
| B.L.L.       | Bachelor of Laws.                                                 |
| B.Sc.        | Bachelor of Science.                                              |
| C.           | Chairman.                                                         |
| C.A.         | Chartered Accountant.                                             |
| C.B.         | Companion of the Bath.                                            |
| C.E.         | Civil Engineer.                                                   |
| C.M.         | ( <i>Chirurgiæ Magister</i> ), Master in Surgery.                 |
| C.M.G.       | Companion of St Michael and St George.                            |
| C.S.I.       | Companion of the Star of India.                                   |
| D.C.L.       | Doctor of Civil Law.                                              |
| D.D.         | Doctor of Divinity.                                               |
| D.Lit.       | Doctor of Literature.                                             |
| D.M.         | Doctor of Medicine [Oxford].                                      |
| D.Sc.        | Doctor of Science.                                                |
| Ebor.        | ( <i>Eboracensis</i> ), of York. <sup>1</sup>                     |
| F.C.S.       | Fellow of the Chemical Society.                                   |
| F.D.         | ( <i>Fidei Defensor</i> ), Defender of the Faith.                 |
| F.F.P.S.     | Fellow of the Faculty of Physicians & Surgeons [Glasgow.]         |
| F.G.S.       | Fellow of the Geological Society.                                 |
| F.K.Q.C.P.L. | Fellow of King and Queen's College of Physicians in Ireland.      |
| F.L.S.       | Fellow of the Linnæan Society.                                    |
| F.M.         | Field Marshal.                                                    |
| F.P.S.       | Fellow of the Philological Society.                               |
| F.R.A.S.     | Fellow of the Royal Astronomical Society.                         |
| F.R.C.P.     | Fellow of the Royal College of Physicians.                        |
| F.R.C.P.E.   | Fellow of the Royal College of Physicians of Edinburgh.           |
| F.R.C.S.     | Fellow of the Royal College of Surgeons.                          |
| F.R.G.S.     | Fellow of the Royal Geographical Society.                         |
| F.R.S.       | Fellow of the Royal Society.                                      |
| F.R.S.E.     | Fellow of the Royal Society of Edinburgh.                         |
| F.R.S.L.     | Fellow of the Royal Society of Literature.                        |
| F.S.A.       | Fellow of the Society of Antiquaries.                             |
| F.S.S.       | Fellow of the Statistical Society.                                |
| F.Z.S.       | Fellow of the Zoological Society.                                 |
| G.C.B.       | Knight Grand Cross of the Bath.                                   |
| G.C.H.       | Knight Grand Cross of Hanover.                                    |
| G.C.M.G.     | Knight Grand Cross of St Michael and St George.                   |
| G.C.S.I.     | Knight Grand Commander of the Star of India.                      |
| H.R.H.       | His (or Her) Royal Highness.                                      |
| J.P.         | Justice of the Peace.                                             |
| J.U.D.       | ( <i>Juris utriusque Doctor</i> ), Doctor of Civil and Canon Law. |
| K.C.S.I.     | Knight Commander of the Star of India.                            |
| K.C.B.       | Knight Commander of the Bath.                                     |
| K.G.         | Knight of the Garter.                                             |
| K.P.         | Knight of St Patrick.                                             |
| K.T.         | Knight of the Thistle.                                            |
| L.A.H.       | Licentiate of the Apothecaries' Hall.                             |
| L.C.J.       | Lord Chief Justice.                                               |
| LL.B.        | ( <i>Legum Baccalaureus</i> ), Bachelor of Laws.                  |
| LL.D.        | ( <i>Legum Doctor</i> ), Doctor of Laws.                          |
| LL.M.        | ( <i>Legum Magister</i> ), Master of Laws.                        |
| L.R.C.P.     | Licentiate of the Royal College of Physicians.                    |
| L.R.C.S.     | Licentiate of the Royal College of Surgeons.                      |
| L.S.A.       | Licentiate of the Apothecaries' Society.                          |
| M.A.         | Master of Arts.                                                   |
| M.B.         | ( <i>Medicina Baccalaureus</i> ), Bachelor of Medicine.           |
| M.C.         | Member of Congress.                                               |
| M.D.         | ( <i>Medicina Doctor</i> ), Doctor of Medicine.                   |
| M.P.         | Member of Parliament.                                             |
| M.R.C.P.     | Member of the Royal College of Physicians.                        |
| M.R.I.A.     | Member of the Royal Irish Academy.                                |
| Mus. B.      | Bachelor of Music.                                                |

<sup>1</sup> An archbishop or bishop, in writing his signature, substitutes for his surname the name of his see; thus the prelates of Canterbury, York, Oxford, London, &c., subscribe themselves A. C. Cantuar., W. Ebor. J. F. Oxon., J. London, &c.



Mus. D. Doctor of Music.  
N.P. Notary Public.  
P.C. Privy Councillor.  
Ph.D. (*Philosophia Doctor*), Doctor of Philosophy.  
P.P. Parish Priest.  
P.R.A. President of the Royal Academy.  
Q.C. Queen's Counsel.  
R. (*Regina*), King, Queen.  
R.A. Royal Academician. Royal Artillery.  
R.A.M. Royal Academy of Music.  
R.E. Royal Engineers.  
Reg. Prof. Regius Professor.  
R.M. Royal Marines.  
R.N. Royal Navy.  
S. or St. Saint.  
S.S.C. Solicitor before the Supreme Courts [of Scotland].  
S.T.P. (*Sacrosanctæ Theologiæ Professor*), Professor of Sacred Theology.  
V.C. Vice-Chancellor. Victoria Cross.  
V.G. Vicar-General.  
V.S. Veterinary Surgeon.  
W.S. Writer to the Signet [in Scotland]. Equivalent to Attorney.

## 2. ABBREVIATIONS DENOTING MONIES, WEIGHTS, AND MEASURES:—

|              |                             |                                                              |
|--------------|-----------------------------|--------------------------------------------------------------|
| ac.          | acre.                       | L. <sup>s</sup> £ <sup>s</sup> or L. ( <i>libra</i> ), pound |
| bar.         | barrel.                     | (money).                                                     |
| bus.         | bushel.                     | lb. or lb. ( <i>libra</i> ), pound (weight).                 |
| c.           | cent.                       | m. or mi. mds; minute.                                       |
| c. (or cub.) | ft. &c. cubic foot, &c.     | mo. month.                                                   |
| cwt.         | hundredweight.              | na. nail.                                                    |
| d.           | ( <i>denarius</i> ), penny. | oz. ounce.                                                   |
| deg.         | degree.                     | pk. peck.                                                    |
| dr.          | drachm or dram.             | po. pola.                                                    |
| dwt.         | pennyweight.                | pt. pint.                                                    |
| f.           | franc.                      | q. ( <i>quadrans</i> ), farthing.                            |
| fl.          | florin.                     | qr. quarter.                                                 |
| ft.          | foot.                       | qt. quart.                                                   |
| fur.         | furlong.                    | ro. rod.                                                     |
| gal.         | gallon.                     | Ra. <sup>s</sup> rupees.                                     |
| gr.          | grain.                      | s. or / ( <i>solidus</i> ), shilling.                        |
| h. or hr.    | hour.                       | s. or sec. second.                                           |
| hhd.         | hogshead.                   | sc. or scr. scruple.                                         |
| in.          | inch.                       | sq. ft. &c. square foot, &c.                                 |
| kilo.        | kilometre.                  | st. stone.                                                   |
|              |                             | yd. yard.                                                    |

## 3. MISCELLANEOUS ABBREVIATIONS.

A. Accepted.  
A.C. (*Ante Christum*), Before Christ.  
acc., a/c., or acct. Account.  
A.D. (*Anno Domini*), In the year of our Lord.  
A.E.I.O.U. Austria est imperare orbi universo.\* or Alles Erdreich.  
1st Oesterreich Unterthan.  
Æt. or Ætat. (*Ætatis* [anno]), In the year of his age.  
A.H. (*Anno Hegiræ*), In the year of the Hegira (the Mohammedan era).  
A.M. (*Anno Mundi*), In the year of the world.  
A.M. (*Ante meridiem*), Forenoon.  
Anon. Anonymous.  
A.U.C. (*Anno urbis conditæ*), In the year from the building of the city (i.e., Rome).  
B.C. Before Christ.  
C. or Cap. (*Caput*), Chapter.  
C. Centigrade (or Celsius's) Thermometer.  
cent. (*Centum*), A hundred, frequently £100.  
Cf. (*Confer*), Compare.  
Ch. or Chap. Chapter.  
Co. Company. County.  
Cr. Creditor.  
curr. Current, the present month.  
D.G. (*Dei gratia*), By the grace of God.  
Dc. Ditto, the same.  
D.O.M. (*Deo Optimo Maximo*), To God the Best and Greatest.  
Dr. Debtor.  
D.V. (*Deo volente*), God willing.

e.g. (*Exempli gratia*), For example.  
ect. or &c. (*Et cætera*), And the rest; and so forth.  
Ex. Example.  
F. or Fahr. Fahrenheit's Thermometer.  
Fec. (*Fecit*), He made (or did) it.  
fl. Flourished.  
Fo. or Fol. Folio.  
f.o.b. Free on board.  
G.P.O. General Post Office.  
H.M.S. Her Majesty's Ship.  
Ib. or Ibid. (*Ibidem*), In the same place.  
Id. (*Idem*), The same.  
i.e. (*Id est*), That is.  
I.H.S. (*Jesus Hominum Salvator*), Jesus the Saviour of men.  
Inf. (*Infra*), Below.  
inst. Instant, the present month.  
I.O.U. I owe you.  
i.q. (*Idem quod*), The same as.  
x. &c. (*et cætera*), Et cætera, and the rest.  
L. or Lib. (*Libri*), Book.  
Lat. Latitude.  
l.c. (*Loco citato*), In the place cited.  
Lon. or Long. Longitude.  
L.S. (*Locus sigill*), The place of the seal.  
Mem. (*Memento*), Remember, Memorandum.  
MS. Manuscript. MSS. Manuscripts.  
N.B. (*Nota bene*), Mark well; take notice.  
N.B. North Britain (i.e., Scotland).  
N.D. No date.  
nem. con. (*Nemine contradicente*), No one contradicting.  
No. (*Numero*), Number.  
N.S. New Style.  
N.T. New Testament.  
ob. (*Obiit*), Died.  
Obs. Obsolete.  
O.H.M.S. On Her Majesty's Service.  
O.S. Old Style.  
O.T. Old Testament.  
P. Page. Pp. Pages.  
£. (*Per*), For; e.g., 5 lb., For one pound.  
Pinx. (*Pinxit*), He painted it.  
P.M. (*Post meridiem*), Afternoon.  
P.O. Post Office. P.O.O. Post Office Order.  
P.P.C. (*Pour prendre congé*), To take leave.  
P.R. Prize-ring.  
prox. (*Proximo* [mense]), Next month.  
P.S. Postscript.  
Pt. Part.  
p.t. or pro. tem. (*Pro tempore*), For the time.  
P.T.O. Please turn over.  
Q., Qu., or Qy. Query; Question.  
q.d. (*Quasi dicat*), As if he should say; as much as to say.  
Q.E.D. (*Quod erat demonstrandum*), which was to be demonstrated.  
Q.E.F. (*Quod erat faciendum*), which was to be done.  
q.s. or quant. suff. (*Quantum sufficit*), As much as is sufficient.  
q.v. (*Quod vide*), Which see.  
R. or R. (*Recipe*), Take.  
✓ (= r. for radius), the sign of the square root.  
R.I.P. (*Requiescat in pace*), May he rest in peace!  
sc. (*Scilicet*), Namely; that is to say.  
Sc. or Sculp. (*Sculpsit*), He engraved it.  
S.D.U.K. Society for the Diffusion of Useful Knowledge.  
seq. or sq., seqq. or sqq. (*Sequens, sequentia*), The following.  
s.p. (*Sine prolo*), Without offering.  
S.P.G. Society for the Propagation of the Gospel.  
Sup. (*Supra*), Above.  
s.v. (*Sub voce*), Under the word (or heading).  
T.C.D. Trinity College, Dublin.  
ult. (*Ultimo* [mense]), Last month.  
U.S. United States.  
v. (*Versus*), Against.  
v. or vid. (*Vide*), See.  
viz. (*Videlicet*), Namely.  
V. R. (*Victoria Regina*), Victoria the Queen.  
Xmas. Christmas [This X is a Greek letter, corresponding to Ch]

(See Grævius's *Thesaurus Antiquitatum*, 1694, sqq.; Nicolai's *Tractatus de Sigillis Veterum*; Mommsen's *Corpus Inscriptionum Latinarum*, 1863, sqq.; Natalis de Wailly's *Paléographie*, Paris, 1838; Alph. Chassant's *Paléographie*, 1854, and *Dictionnaire des Abréviations*, 3d ed., 1866. A manual of the abbreviations in current use is a desideratum.)

ABBREVIATORS, a body of writers in the Papal Chancery, whose business is to sketch out and prepare in due form the Pope's bulls, briefs, and consistorial decrees.

\* Characters, not properly abbreviations, are used in the same way; e.g., ° for "degrees, minutes, seconds," (circular measure); 3, 3, 3 for "ounces, drachms, scruples." 3 is probably to be traced to the written form of the s in "æ."

† These forms (as well as \$, the symbol for the American dollar) are placed before their amounts.

‡ It is given to Austria to rule the whole earth. The device of Austria, first adopted by Frederick III.

§ "Per cent." is often signified by %, a form traceable to "100."

They are first mentioned in a bull of Benedict XII, early in the 14th century. Their number is fixed at seventy-two, of whom twelve, distinguished as *de parco majori*, hold prelatial rank; twenty-two, *de parco minori*, are clergymen of lower rank; and the remainder, *examinatores*, may be laymen.

ABDALLATIF, or ABD-UL-LATIF, a celebrated physician and traveller, and one of the most voluminous writers of the East, was born at Baghdad in 1162. An interesting memoir of Abdallatif, written by himself, has been preserved with additions by Ibn-Abu-Osaiba, a contemporary. From that work we learn that the higher education of the youth of Baghdad consisted principally in a minute and careful study of the rules and principles of grammar, and in their committing to memory the whole of the Koran, a treatise or two on philology and jurisprudence, and the choicest Arabian poetry. After attaining to great proficiency in that kind of learning, Abdallatif applied himself to natural philosophy and medicine. To enjoy the society of the learned, he went first to Mosul (1189), and afterwards to Damascus, the great resort of the eminent men of that age. The chemical fooleries that engrossed the attention of some of these had no attraction for him, but he entered with eagerness into speculative discussions. With letters of recommendation from Saladin's vizier, he visited Egypt, where the wish he had long cherished to converse with Maimonides, "the Eagle of the Doctors," was gratified. He afterwards formed one of the circle of learned men whom Saladin gathered around him at Jerusalem, and shared in the great sultan's favours. He taught medicine and philosophy at Cairo and at Damascus for a number of years, and afterwards, for a shorter period, at Aleppo. His love of travel led him in his old age to visit different parts of Armenia and Asia Minor, and he was setting out on a pilgrimage to Mecca when he died at Baghdad in 1231. Abdallatif was undoubtedly a man of great knowledge and of an inquisitive and penetrating mind, but is said to have been somewhat vain of his attainments. Of the numerous works—most of them on medicine—which Osaiba ascribes to him, one only, the *Account of Egypt*, appears to be known in Europe. The manuscript of this work, which was discovered by Pococke the Orientalist, is preserved in the Bodleian Library. It was translated into Latin by Professor White of Oxford in 1800, and into French, with very valuable notes, by De Sacy in 1810. It consists of two parts: the first gives a general view of Egypt; the second treats of the Nile, and contains a vivid description of a famine caused, during the author's residence in Egypt, by the river failing to overflow its banks. The work gives an authentic detailed account of the state of Egypt during the middle ages.

ABD-EL-KADER, celebrated for his brave resistance to the advance of the French in Algeria, was born near Mascara, in the early part of the year 1807. His father was a man of great influence among his countrymen from his high rank and learning, and Abd-el-Kader himself at an early age acquired a wide reputation for wisdom and piety, as well as for skill in horsemanship and other manly exercises. In 1831 he was chosen Emir of Mascara, and leader of the combined tribes in their attempt to check the growing power of the French in Africa. His efforts were at first successful, and in 1834 he concluded a treaty with the French general, which was very favourable to his cause. This treaty was broken in the succeeding year; but as the war that followed was mainly in favour of the Arabs, peace was renewed in 1837. War again broke out in 1839, and for more than a year was carried on in a very desultory manner. In 1841, however, Marshal Bugeaud assumed the chief command of the French force, which numbered nearly 100,000 men. The war was now carried on with great vigour, and Abd-el-Kader, after a

most determined resistance, surrendered himself to the Duc d'Aumale, on the 22d December 1847. The promise, that he would be allowed to retire to Alexandria or St Jean d'Acre, upon the faith of which Abd-el-Kader had given himself up, was broken by the French government. He was taken to France, and was imprisoned first in the castle of Pau, and afterwards in that of Amboise. In 1852 Louis Napoleon gave him his liberty on condition of his not returning to Algeria. Since then he resided successively at Broussa, Constantinople, and Damascus. He is reported to have died at Mecca in October 1873. See ALGERIA.

ABDERA (1.), in *Ancient Geography*, a maritime town of Thrace, eastward from the mouth of the river Nestus. Mythology assigns the founding of the town to Hercules; but Herodotus states that it was first colonised by Timesias of Clazomena, whom the Thracians in a short time expelled. Rather more than a century later (a.c. 541), the people of Sees recolonised Abdera. The town soon became one of considerable importance, and in a.c. 408, when it was reduced by Thrasylbulus the Athenian, it is described as in a very flourishing condition. Its prosperity was greatly impaired by its disastrous war with the Triballi (circa a.c. 376), and very little is heard of it thereafter. The Abderites, or Abderitani, were proverbial for their want of wit and judgment; yet their city gave birth to several eminent persons, as Protagoras, Democritus, and Anaxarchus the philosophers, Hecateus the historian, Nicænetus the poet, and others.

ABDERA (2.), a town in *Hispania Batica*, founded by the Carthaginians, on the south coast, between Malaca and Prom. Charidemi. It is probably represented by the modern Adra.

ABDICATION, the act whereby a person in office renounces and gives up the same before the expiry of the time for which it is held. The word is seldom used except in the sense of surrendering the supreme power in a state. Despotical sovereigns are at liberty to divest themselves of their powers at any time, but it is otherwise with a limited monarchy. The throne of Great Britain cannot be lawfully abdicated unless with the consent of the two Houses of Parliament. When James II., after throwing the Great Seal into the Thames, fled to France in 1688, he did not formally resign the crown, and the question was discussed in Parliament whether he had forfeited the throne or had abdicated. The latter designation was agreed on, for in a full assembly of the Lords and Commons, met in convention, it was resolved, in spite of James's protest, "that King James II. having endeavoured to subvert the constitution of the kingdom, by breaking the original contract between king and people, and, by the advice of Jesuits and other wicked persons, having violated the fundamental laws, and having withdrawn himself out of this kingdom, has abdicated the government, and that the throne is thereby vacant." The Scotch Parliament pronounced a decree of forfeiture and deposition. Among the most memorable abdications of antiquity may be mentioned that of Sulla the dictator, B.C. 79, and that of the Emperor Diocletian, A.D. 305. The following is a list of the more important abdications of later times:—

|                                                     | A.D.          |
|-----------------------------------------------------|---------------|
| Benedict IX., Pope, . . . . .                       | 1048          |
| Stephen II. of Hungary, . . . . .                   | 1131          |
| Albert (the Bear) of Brandenburg, . . . . .         | 1169          |
| Ladislaus III., Duke of Poland, . . . . .           | 1207          |
| John Balliol of Scotland, . . . . .                 | 1296          |
| John Cantacuzene, Emperor of the East, . . . . .    | 1355          |
| John XXIII., Pope, . . . . .                        | 1415          |
| Eric VII. of Denmark and XIII. of Sweden, . . . . . | 1439          |
| Amurath II., Ottoman Emperor, . . . . .             | 1444 and 1445 |
| Charles V., Emperor, . . . . .                      | 1556          |
| Christina of Sweden, . . . . .                      | 1654          |
| John Casimir of Poland, . . . . .                   | 1668          |
| James II. of England, . . . . .                     | 1688          |
| Frederick Augustus of Poland, . . . . .             | 1706          |



|                                                                |                                  |
|----------------------------------------------------------------|----------------------------------|
| Philip V. of Spain, . . . . .                                  | A.D. 1724                        |
| Victor Amadeus II. of Sardinia, . . . . .                      | 1730                             |
| Achmet III., Ottoman Emperor, . . . . .                        | 1730                             |
| Charles of Naples (on accession to throne of Spain), . . . . . | 1759                             |
| Stanislaus II. of Poland, . . . . .                            | 1795                             |
| Charles Emanuel IV. of Sardinia, . . . . .                     | June 4, 1802                     |
| Charles IV. of Spain, . . . . .                                | Mar. 19, 1808                    |
| Joseph Bonaparte of Naples, . . . . .                          | June 6, 1808                     |
| Gustavus IV. of Sweden, . . . . .                              | Mar. 29, 1809                    |
| Louis Bonaparte of Holland, . . . . .                          | July 2, 1810                     |
| Napoleon of France, . . . . .                                  | April 4, 1814, and June 22, 1815 |
| Victor Emanuel of Sardinia, . . . . .                          | Mar. 13, 1821                    |
| Charles X. of France, . . . . .                                | Aug. 2, 1830                     |
| Pedro of Brazil, . . . . .                                     | April 7, 1831                    |
| Don Miguel of Portugal, . . . . .                              | May 26, 1834                     |
| William I. of Holland, . . . . .                               | Oct. 7, 1840                     |
| Louis Philippe of France, . . . . .                            | Feb. 24, 1843                    |
| Louis Charles of Bavaria, . . . . .                            | Mar. 21, 1843                    |
| Ferdinand of Austria, . . . . .                                | Dec. 2, 1848                     |
| Charles Albert of Sardinia, . . . . .                          | Mar. 23, 1849                    |
| Leopold II. of Tuscany, . . . . .                              | July 21, 1859                    |
| Isabella II. of Spain, . . . . .                               | June 26, 1870                    |
| Amadeus I. of Spain, . . . . .                                 | Feb. 11, 1873                    |

**ABDOMEN**, in *Anatomy*, the lower part of the trunk of the body, situated between the thorax and the pelvis. See **ANATOMY**.

**ABDOMINALES**, or **ABDOMINAL FISHES**, a sub-division of the Malacopterygious Order, whose ventral fins are placed behind the pectorals, under the abdomen. The typical abdominals are carp, salmon, herring, silures, and pike.

**ABDUCTION**, a law term denoting the forcible or fraudulent removal of a person, limited by custom to the case where a woman is the victim. In the case of men or children, it has been usual to substitute the term **KIDNAPPING** (*q.v.*) The old severe laws against abduction, generally contemplating its object as the possession of an heiress and her fortune, have been repealed by 24 and 25 Vict. c. 100, s. 53, which makes it felony for any one from motives of lucre to take away or detain against her will, with intent to marry or carnally know her, &c., any woman of any age who has any interest in any real or personal estate, or is an heiress presumptive, or co-heiress, or presumptive next of kin to any one having such an interest; or for any one to cause such a woman to be married or carnally known by any other person; or for any one with such intent to allure, take away, or detain any such woman under the age of twenty-one, out of the possession and against the will of her parents or guardians. By s. 54, forcible taking away or detention against her will of any woman of any age with like intent is felony. Even without such intent, abduction of any unmarried girl under the age of sixteen is a misdemeanour. In Scotland, where there is no statutory adjustment, abduction is similarly dealt with by practice.

**ABDUL MEDJID**, Sultan of Turkey, the thirty-first sovereign of the house of Othman, was born April 23, 1823, and succeeded his father Mahmoud II. on the 2d of July 1839. Mahmoud appears to have been unable to effect the reforms he desired in the mode of educating his children, so that his son received no better education than that given, according to use and wont, to Turkish princes in the harem. When Abdul Medjid succeeded to the throne, the affairs of Turkey were in an extremely critical state. At the very time his father died, the news was on its way to Constantinople that the Turkish army had been signally defeated at Nisib by that of the rebel Egyptian viceroy, Mehemet Ali; and the Turkish fleet was at the same time on its way to Egypt, to be surrendered perfidiously by its commander to the same enemy. But through the intervention of the great European powers, Mehemet Ali was obliged to come to terms, and the Ottoman empire was saved. In compliance with his father's

Pedro had succeeded to the throne of Portugal in 1826, but abdicated it at once in favour of his daughter.

express instructions, Abdul Medjid set at once about carrying out the extensive reforms to which Mahmoud had so energetically devoted himself. In November 1839 was proclaimed an edict, known as the Hatti-sherif of Gulhané, consolidating and enforcing these reforms, which was supplemented, at the close of the Crimean war, by a similar statute, issued in February 1856. By these enactments it was provided that all classes of the sultan's subjects should have security for their lives and property; that taxes should be fairly imposed and justice impartially administered; and that all should have full religious liberty and equal civil rights. The scheme was regarded as so revolutionary by the aristocracy and the educated classes (the Ulema) that it met with keen opposition, and was in consequence but partially put in force, especially in the remoter parts of the empire; and more than one conspiracy was formed against the sultan's life on account of it. Of the other measures of reform promoted by Abdul Medjid the more important were—the reorganisation of the army (1843-4), the institution of a council of public instruction (1846), the abolition of an odious and unfairly imposed capitation tax, the repression of slave trading, and various provisions for the better administration of the public service and for the advancement of commerce. The public history of his times—the disturbances and insurrections in different parts of his dominions throughout his reign, and the great war successfully carried on against Russia by Turkey, and by England, France, and Sardinia, in the interest of Turkey (1853-56)—can be merely alluded to in this personal notice. When Kossuth and others sought refuge in Turkey, after the failure of the Hungarian rising in 1849, the sultan was called on by Austria and Russia to surrender them, but boldly and determinedly refused. It is to his credit, too, that he would not allow the conspirators against his own life to be put to death. He bore the character of being a kind and honourable man. Against this, however, must be set down his excessive extravagance, especially towards the end of his life. He died on the 25th of June 1861, and was succeeded, not by one of his sons, but by his brother, Abdul Aziz, the present sultan, as the oldest survivor of the family of Othman.

**A BECKET**, THOMAS, Archbishop of Canterbury and Chancellor of England in the 12th century, was born in London on the 21st of December 1118. His father, Gilbert Becket, and his mother Roesa or Matilda, were both, there can be little doubt, of Norman extraction, if indeed they themselves were not immigrants from Normandy to England. Gilbert Becket, a merchant, and at one time Sheriff of London, a man of generous impulses and somewhat lavish hospitality, provided for his only child Thomas all the attainable advantages of influential society and a good education. At ten years of age Thomas was placed under the tuition of the canons regular of Merton on the Wandle in Surrey. From Merton he proceeded to study in the London schools, then in high repute. At Pevensey Castle, the seat of his father's friend Richer de l'Aigle, one of the great barons of England, he subsequently became a proficient in all the feats and graces of chivalry. From Pevensey he betook himself to the study of theology in the University of Paris. He never became a scholar, much less a theologian, like Wolsey, or even like some of the learned ecclesiastics of his own day; but his intellect was vigorous and original, and his manners captivating to his associates and popular with the multitude. His father's failure in business recalled him to London, and for three years he acted as a clerk in a lawyer's office. But a man so variously accomplished could not fail to stumble on preferment sooner or later. Accordingly, about 1142, Archdeacon Baldwin, a learned civilian, a friend of the elder Becket, introduced him to Theobald, Archbishop of

Canterbury, who at once appointed him to an office in the Archiepiscopal Court. His talents speedily raised him to the archdeaconry of the see. A Becket's tact in assisting to thwart an attempt to interest the Pope in favour of the coronation of Stephen's son Eustace, paved the way to the archdeacon's elevation to the Chancellorship of England under Henry II., a dignity to which he was raised in 1155. As he had served Theobald the archbishop, so he served Henry the king faithfully and well. It was his nature to be loyal. Enthusiastic partisanship is, in fact, the key to much that is otherwise inexplicable in his subsequent conduct towards Henry. When at a later period A Becket was raised to the primacy of England, a dignity not of his own seeking, he must needs quarrel with Henry in the interest of the Pope and "for the honour of God." As Chancellor of England he appeared in the war of Toulouse at the head of the chivalry of England, and "who can recount," says his attendant and panegyrist Grim, "the carnage, the desolation he made at the head of a strong body of soldiers! He attacked castles, and razed towns and cities to the ground; he burned down houses and farms, and never showed the slightest touch of pity to any one who rose in insurrection against his master." In single combat he vanquished and made prisoner the valiant Knight Engelram de Trie. Nor did A Becket the chancellor seek to quell Henry's secular foes alone. He was the able mouthpiece of the Crown in its contention with the Bishop of Chichester, who had alleged that the permission of the Pope was necessary to the conferring or taking away of ecclesiastical benefices; and he rigorously exacted *scutage*, a military tax in lieu of personal service in the field, from the clergy, who accused him of "plunging a sword into the bosom of his mother the church." His pomp and munificence as chancellor were beyond precedent. In 1159 he undertook, at Henry's request, an embassy to the French Court for the purpose of affiancing the king's eldest son to the daughter of the king of France. His progress through the country was like a triumphal procession. "How wonderful must be the king of England himself whose chancellor travels in such state!" was on every one's lips. In 1162 he was elected Archbishop of Canterbury, Gilbert Foliot, Bishop of Hereford, alone dissenting, and remarking sarcastically, at the termination of the ceremony, that "the king had worked a miracle in having that day turned a layman into an archbishop and a soldier into a saint." Hitherto A Becket had only been in deacon's orders, and had made no profession of sanctity of life. At the same time, there is nothing to show that his character was stained by the gross licentiousness of the times. Now, however, he devoted himself body and soul to the service of the church. The fastidious courtier was at once transformed into the squalid penitent, who wore hair-cloth next his skin, fed on roots, drank nauseous water, and daily washed the feet of thirteen beggars. Henry, who had expected to see the archbishop completely sunk in the chancellor, was amazed to receive the following laconic message from A Becket:—"I desire that you will provide yourself with another chancellor, as I find myself hardly sufficient for the duties of one office, much less of two." From that moment there was strife between A Becket and Henry, A Becket straining every nerve to extend the authority of the Pope, and Henry doing his utmost to subject the church to his own will. Throughout the bitter struggle for supremacy which ensued between A Becket and the king, A Becket was backed by the sympathy of the Saxon populace, Henry by the support of the Norman barons and by the greater dignitaries of the church. At the outset A Becket was worsted. He was constrained to take an oath, "with good faith and without fraud or reserve, to observe the Constitutions of Clarendon," which subjected clerks guilty of crime to the ordinary

civil tribunals, put ecclesiastical dignities at the royal disposal, prevented all appeals to Rome, and made Henry the virtual "head of the church." For his guilty compliance with these anti-papal constitutions he received the special pardon and absolution of his holiness, and proceeded to anathematise them with the energy of a genuine remorse. The king resolved on his ruin. He was summoned before a great council at Northampton, and in defiance of justice was called on to account for the sum of 44,000 marks declared to have been misappropriated by him during his chancellorship. "For what happened before my consecration," said A Becket, "I ought not to answer, nor will I. Know, moreover, that ye are my children in God; neither law nor reason allows you to judge your father. I refer my quarrel to the decision of the Pope. To him I appeal, and shall now, under the protection of the Catholic Church and the Apostolic See, depart." He effected his escape to France, and took refuge in the Cistercian monastery of Pontigny, whence he repeatedly anathematized his enemies in England, and hesitated not to speak of Henry as a "malicious tyrant." Pope Alexander III., though at heart a warm supporter of Becket, was guarded in his conduct towards Henry, who had shown a disposition to support the anti-pope Pascal III., and it was not till the Archbishop of York, in defiance of a papal bull, had usurped the functions of the exiled primate by officiating at the coronation of Henry's son, that Alexander became really formidable. A Becket was now resolute for martyrdom or victory. Henry began to tremble, and an interview between him and Becket was arranged to take place at Fereville in 1170. It was agreed that A Becket should return to his see, and that the king should discharge his debts and defray the expenses of his journey. A Becket proceeded to the coast, but the king, who had promised to meet him, broke his engagement in every particular. A Becket, in retaliation, excommunicated the Archbishop of York and the Bishops of London and Salisbury for officiating at the coronation of the king's son. The terrified prelates took refuge in Normandy with Henry, who, on hearing their tale, accompanied by an account of A Becket's splendid reception at Canterbury, exclaimed in ungovernable fury, "Of the cowards who eat my bread, is there not one who will free me from this turbulent priest!" Four knights, Fitzurse, Tracy, Morville, and Brito, resolved to avenge their sovereign, who it appears was ignorant of their intention. They arrived in Canterbury, and finding the archbishop, threatened him with death if he would not absolve the excommunicated bishops. "In vain," replied A Becket, "you threaten me. If all the swords in England were brandishing over my head, your terrors could not move me. Foot to foot you will find me fighting the battle of the Lord." He was barbarously murdered in the great cathedral, at the foot of the altar of St Benedict, on the 29th December 1170. Two years thereafter he was canonised by the Pope; and down to the Reformation innumerable pilgrimages were made to the shrine of St Thomas of Canterbury by devotees from every corner of Christendom. So numerous were the miracles wrought at his tomb, that Gervase of Canterbury tells us two large volumes kept in the cathedral were filled with accounts of them. Every fiftieth year a jubilee was celebrated in his honour, which lasted fifteen days; plenary indulgences were then granted to all who visited his tomb; and as many as 100,000 pilgrims were registered at a time in Canterbury. The worship of St Thomas superseded the adoration of God, and even that of the Virgin. In one year there was offered at God's altar nothing; at that of the Virgin £4, 1s. 8d.; while St Thomas received for his share £954, 6s. 3d.—an enormous sum, if the purchasing power of money in those times be considered. Henry VIII., with a just if somewhat ludicrous appreciation of the issue which A Becket had raised



with his royal predecessor Henry II., not only pilaged the rich shrine dedicated to St Thomas, but caused the saint himself to be cited to appear in court, and to be tried and condemned as a traitor, at the same time ordering his name to be struck out of the calendar, and his bones to be burned and the ashes thrown in the air. A Becket's character and aims have been the subject of the keenest ecclesiastical and historic controversy down to the present time, but it is impossible to doubt the fundamental sincerity of the one or the disinterestedness of the other, however inconsistent his actions may sometimes appear. If the fruit of the Spirit be "love, joy, peace, long-suffering, gentleness, goodness, faith, meekness, and temperance," A Becket was assuredly not a saint, for he indulged to the last in the bitterest invectives against his foes; but that he fought with admirable courage and devotion the "battle of the Lord," according to the warlike ideas of an age with which he was in intense sympathy, is beyond dispute. He was the leading Ultramontane of his day, hesitating not to reprove the Pope himself for lukewarmness in the cause of the "church's liberty." He was the last of the great ecclesiastics of the type of Lanfranc and Anselm, who struggled for supremacy with the civil power in England on almost equal terms. In his day the secular stream was running very strong, and he might as chancellor have floated down the current pleasantly enough, governing England in Henry's name. He nevertheless perished in a chivalrous effort to stem the torrent. The tendency of his principles was to supersede a civil by a spiritual despotism; "but, in point of fact," says Hook, in his valuable *Life*, "he was a high-principled, high-spirited demagogue, who taught the people to struggle for their liberties," a struggle soon to commence, and of which he was by no means an impotent if an unconscious precursor.—See Dr Giles's *Vita et Epistolæ S. Thomæ Cantuariensis*; Canon Morris's *Life of St Thomas Becket*; Canon Robertson's *Life of Becket*; Canon Stanley's *Historical Memorials of Canterbury*; J. G. Nichol's *Pilgrimages of Walsingham and Canterbury*; Hook's *Lives of the Archbishops of Canterbury*; and Lord Campbell's *Lives of the Chancellors of England*.

A'BECKETT, GILBERT ABBOTT, a successful cultivator of light literature, was born in London in 1811, and educated at Westminster School. He wrote burlesque dramas with success from his boyhood, took an active share in the establishment of different comic periodicals, particularly *Figaro in London and Punch*, and was a constant contributor to the columns of the latter from its commencement till the time of his death. His principal publications, all overflowing with kindly humour, and rich in quaint fancies, are his parodies of living dramatists (himself included), reprinted from *Punch* (1844); *The Small Debts Act, with Annotations and Explanations* (1845); *The Quizzology of the British Drama and The Comic Blackstone* (1846); *A Comic History of England* (1847); and *A Comic History of Rome* (1852). He contributed occasionally, too, to the *Times* and other metropolitan papers. A'Beckett was called to the bar in 1841, and from 1849 discharged with great efficiency the duties of a metropolitan police magistrate. He died at Boulogne on the 30th of August 1856.

ABEL (אָבֶל, *breath, vanity, transitoriness*), the second son of Adam, slain by Cain his elder brother (Gen. iv. 1-16). The narrative in Genesis, which tells us that "the Lord had respect unto Abel and to his offering, but unto Cain and to his offering he had not respect," is supplemented by the statement of the New Testament, that "by faith Abel offered unto God a more excellent sacrifice than Cain," (Heb. xi. 4), and that Cain slew Abel "because his own works were evil and his brother's righteous" (1 John iii. 12).

In patristic theology the striking contrast between the brothers was mystically explained and typically applied in various ways. Augustine, for example, regards Abel as the representative of the regenerate or spiritual man, and Cain as the representative of the natural or corrupt man. Augustine in his treatise *De Hæresibus*, c. 86, mentions a sect of *Abelites* or *Abelians*, who seem to have lived in North Africa, and chiefly in the neighbourhood of Hippo-Regius. According to their tradition, Abel, though married, lived in continence, and they followed his practice in this respect, so as to avoid the guilt of bringing sinful creatures into the world.

ABEL, KARL FRIEDRICH (1726-1787), a celebrated German musician. His adagio compositions have been highly praised, but he attained greater distinction as a performer than as a composer, his instrument being the *Viola di gamba*, which from his time has given place to the violoncello. He studied under Sebastian Bach, played for ten years (1748-58) in the band formed at Dresden by the Elector of Saxony, under Hasse, and then, proceeding to England, became (1759) chamber-musician to the queen of George III. His life was shortened by habits of intemperance.

ABEL, NIELS HENRIK, one of the ablest and acutest mathematicians of modern times, was born at Findöe in Norway in 1802, and died near Arendal in 1829. Considering the shortness of his life, the extent and thoroughness of his mathematical investigations and analyses are marvellous. His great powers of generalisation were displayed in a remarkable degree in his development of the theory of elliptic functions. Legendre's eulogy of Abel, "Quelle tête celle du jeune Norvégien!" is the more forcible, that the French mathematician had occupied himself with those functions for most of his lifetime. Abel's works, edited by M. Holmboe, the professor under whom he studied at Christiania, were published by the Swedish government in 1839.

ABEL, THOMAS, a Roman Catholic divine during the reign of Henry VIII., was an Englishman, but when or where born does not appear. He was educated at Oxford, where he passed B.A. on 4th July 1513, M.A. on 27th June 1516, and proceeded D.D. On 23d June 1530 he was presented by Queen Catherine to the rectory of Bradwell in Essex, on the sea-coast. He had been introduced to the court through the report of his learning in classical and living languages, and accomplishments in music; and he was appointed domestic chaplain to Queen Catherine. It speaks well both for the chaplain and his royal mistress, that to the last he defended the outraged queen against "bluff King Hal." The *Defence*, "*Invicta Veritas*," was printed at Luneberge in 1532. This pungent little book was replied to, but never answered, and remains the defence on Queen Catherine's part. Abel was ensnared, as greater men were, in the prophetic delusions and ravings of Elizabeth Barton, called the "Holy Maid of Kent." As belonging to the Church of Rome, he inevitably opposed Henry VIII.'s assumption of supremacy in the church. Ultimately he was tried and condemned for "misprision of treason," and perished in the usual cruel and ignominious way. The execution, as described, took place at Smithfield on July 30, 1540. If we may not concede the venerable and holy name of martyr to Abel—and John Foxe is passionate in his refusal of it—yet we must hold that he at least fell a victim to his unsparing defence of his queen and friend, the "misprision of treason" having been a foregone conclusion. In stat. 25, Henry VIII., c. 12, he is described as having "caused to be printed and set forth in this realm diverse books against the divorce and separation." Neither the *Tractatus* nor the "diverse books" are known.—Dodd, *Church History*, Brussels, 1737, folio, vol. i. p. 208; Boucher, *Hist. Eccl.*

*de Martyr. Fratr. minor.* (Ingolst. 1583); Pitts, *De illustr. Angl. Script.*; Tanner's *Bibliotheca Hibernico-Britannica*, p. i.; Zurich, *Original Letters relative to the English Reformation* (Parker Society, pt. ii. pp. 209-211, 1846); Foxe's *Acts and Monuments* (Cattley's, vol. v. pp. 438-440); Burnet, *Soames, Biog. Brit.*; Wood's *Athenæa* (Bliss), s. v.; Stow, *Chron.* p. 581.

(A. B. G.)

ABELARD, PETER, born at Pallet (Palais), not far from Nantes, in 1079, was the eldest son of a noble Breton house. The name *Abælardus* (also written *Abailardus*, *Abaielardus*, and in many other ways) is said to be a corruption of *Habelardus*, substituted by himself for a nickname *Bajolardus* given to him when a student. As a boy, he showed an extraordinary quickness of apprehension, and, choosing a learned life instead of the active career natural to a youth of his birth, early became an adept in the art of dialectic, under which name philosophy, meaning at that time chiefly the logic of Aristotle transmitted through Latin channels, was the great subject of liberal study in the episcopal schools. Roscellin, the famous canon of Compiègne, is mentioned by himself as his teacher; but whether he heard this champion of extreme Nominalism in early youth, when he wandered about from school to school for instruction and exercise, or some years later, after he had already begun to teach for himself, remains uncertain. His wanderings finally brought him to Paris, still under the age of twenty. There, in the great cathedral school of Notre-Dame, he sat for a while under the teaching of William of Champeaux, the disciple of St Anselm and most advanced of Realists, but, presently stepping forward, he overcame the master in discussion, and thus began a long duel that issued in the downfall of the philosophic theory of Realism, till then dominant in the early Middle Age. First, in the teeth of opposition from the metropolitan teacher, he proceeded to set up a school of his own at Melun, whence, for more direct competition, he removed to Corbeil, nearer Paris. The success of his teaching was signal, though for a time he had to quit the field, the strain proving too great for his physical strength. On his return, after 1108, he found William lecturing no longer at Notre-Dame, but in a monastic retreat outside the city, and there battle was again joined between them. Forcing upon the Realist a material change of doctrine, he was once more victorious, and thenceforth he stood supreme. His discomfited rival still had power to keep him from lecturing in Paris, but soon failed in this last effort also. From Melun, where he had resumed teaching, Abelard passed to the capital, and set up his school on the heights of St Geneviève, looking over Notre-Dame. When he had increased his distinction still further by winning reputation in the theological school of Anselm of Laon, no other conquest remained for him. He stepped into the chair at Notre-Dame, being also nominated canon, about the year 1115.

Few teachers ever held such sway as Abelard now did for a time. Distinguished in figure and manners, he was seen surrounded by crowds—it is said thousands—of students, drawn from all countries by the fame of his teaching, in which acuteness of thought was relieved by simplicity and grace of exposition. Enriched by the offerings of his pupils, and feasted with universal admiration, he came, as he says, to think himself the only philosopher standing in the world. But a change in his fortunes was at hand. In his devotion to science, he had hitherto lived a very regular life, varied only by the excitement of conflict: now, at the height of his fame, other passions began to stir within him. There lived at that time, within the precincts of Notre-Dame, under the care of her uncle, the canon Fulbert, a young girl named Heloise, of noble extraction and born about 1101. Fair, but still

more remarkable for her knowledge, which extended beyond Latin, it is said, to Greek and Hebrew, she awoke a feeling of love in the breast of Abelard; and with intent to win her, he sought and gained a footing in Fulbert's house as a regular inmate. Becoming also tutor to the maiden, he used the unlimited power which he thus obtained over her for the purpose of seduction, though not without cherishing a real affection which she returned in unparalleled devotion. Their relation interfering with his public work, and being, moreover, ostentatiously sung by himself, soon became known to all the world except the too-confiding Fulbert; and, when at last it could not escape even his vision, they were separated only to meet in secret. Thereupon Heloise found herself pregnant, and was carried off by her lover to Brittany, where she gave birth to a son. To appease her furious uncle, Abelard now proposed a marriage, under the condition that it should be kept secret, in order not to mar his prospects of advancement in the church; but of marriage, whether public or secret, Heloise would hear nothing. She appealed to him not to sacrifice for her the independence of his life, nor did she finally yield to the arrangement without the darkest forebodings, only too soon to be realised. The secret of the marriage was not kept by Fulbert; and when Heloise, true to her singular purpose, boldly then denied it, life was made so unsupportable to her that she sought refuge in the convent of Argenteuil. Immediately Fulbert, believing that her husband, who aided in the flight, designed to be rid of her, conceived a dire revenge. He and some others broke into Abelard's chamber by night, and, taking him defenceless, perpetrated on him the most brutal mutilation. Thus cast down from his pinnacle of greatness into an abyss of shame and misery, there was left to the brilliant master only the life of a monk. Heloise, not yet twenty, consummated her work of self-sacrifice at the call of his jealous love, and took the veil.

It was in the Abbey of St Denis that Abelard, now aged forty, sought to bury himself with his woes out of sight. Finding, however, in the cloister neither calm nor solitude, and having gradually turned again to study, he yielded after a year to urgent entreaties from without and within, and went forth to reopen his school at the Priory of Maisoncelle (1120). His lectures, now framed in a devotional spirit, were heard again by crowds of students, and all his old influence seemed to have returned; but old enmities were revived also, against which he was no longer able as before to make head. No sooner had he put in writing his theological lectures (apparently the *Introductio ad Theologiam* that has come down to us), than his adversaries fell foul of his rationalistic interpretation of the Trinitarian dogma. Charging him with the heresy of Sabellius in a provincial synod held at Soissons in 1121, they procured by irregular practices a condemnation of his teaching, whereby he was made to throw his book into the flames, and then was shut up in the convent of St Médard. After the other, it was the bitterest possible experience that could befall him, nor, in the state of mental desolation into which it plunged him, could he find any comfort from being soon again set free. The life in his own monastery proving no more congenial than formerly, he fled from it in secret, and only waited for permission to live away from St Denis before he chose the one lot that suited his present mood. In a desert place near Nogent-sur-Seine, he built himself a cabin of stubble and reeds, and turned hermit. But there fortune came back to him with a new surprise. His retreat becoming known, students flocked from Paris, and covered the wilderness around him with their tents and huts. When he began to teach again, he found consolation, and in gratitude he consecrated the new oratory they built for him by the name of the Paraclete



Upon the return of new dangers, or at least of fears, Abelard left the Paraclete to make trial of another refuge, accepting an invitation to preside over the Abbey of St Gildas-de-Rhuys, on the far-off shore of Lower Brittany. It proved a wretched exchange. The region was inhospitable, the domain a prey to lawless exaction, the house itself savage and disorderly. Yet for nearly ten years he continued to struggle with fate before he fled from his charge, yielding in the end only under peril of violent death. The misery of those years was not, however, unrelieved; for he had been able, on the breaking-up of Heloise's convent at Argenteuil, to establish her as head of a new religious house at the deserted Paraclete, and in the capacity of spiritual director he often was called to revisit the spot thus made doubly dear to him. All this time Heloise had lived amid universal esteem for her knowledge and character, uttering no word under the doom that had fallen upon her youth; but now, at last, the occasion came for expressing all the pent-up emotions of her soul. Living on for some time in Brittany after his flight from St Gildas, Abelard wrote, among other things, his famous *Historia Calamitatum*, and thus moved her to pen her first *Letter*, which remains an unsurpassed utterance of human passion and womanly devotion; the first being followed by the two other *Letters*, in which she finally accepted the part of resignation which, now as a brother to a sister, Abelard commended to her. He not long after was seen once more upon the field of his early triumphs, lecturing on Mount St Geneviève in 1136 (when he was heard by John of Salisbury), but it was only for a brief space: no new triumph, but a last great trial, awaited him in the few years to come of his chequered life. As far back as the Paraclete days, he had counted as chief among his foes Bernard of Clairvaux, in whom was incarnated the principle of fervent and unhesitating faith, from which rational inquiry like his was sheer revolt, and now this uncompromising spirit was moving, at the instance of others, to crush the growing evil in the person of the boldest offender. After preliminary negotiations, in which Bernard was roused by Abelard's steadfastness to put forth all his strength, a council met at Sens, before which Abelard, formally arraigned upon a number of heretical charges, was prepared to plead his cause. When, however, Bernard, not without foregone terror in the prospect of meeting the redoubtable dialectician, had opened the case, suddenly Abelard appealed to Rome. The stroke availed him nothing; for Bernard, who had power, notwithstanding, to get a condemnation passed at the council, did not rest a moment till a second condemnation was procured at Rome in the following year. Meanwhile, on his way thither to urge his plea in person, Abelard had broken down at the Abbey of Cluni, and there, an utterly fallen man, with spirit of the humblest, and only not bereft of his intellectual force, he lingered but a few months before the approach of death. Removed by friendly hands, for the relief of his sufferings, to the Priory of St Marcel, he died on the 21st of April 1142. First buried at St Marcel, his remains soon after were carried off in secrecy to the Paraclete, and given over to the loving care of Heloise, who in time came herself to rest beside them. The bones of the pair were shifted more than once afterwards, but they were marvellously preserved even through the vicissitudes of the French Revolution, and now they lie united in the well-known tomb at Pere-Lachaise.

Great as was the influence exerted by Abelard on the minds of his contemporaries and the course of mediæval thought, he has been little known in modern times but for his connection with Heloise. Indeed, it was not till the present century, when Cousin in 1836 issued the collection entitled *Ouvrages inédits d'Abelard*, that his

philosophical performance could be judged at first hand; of his strictly philosophical works only one, the ethical treatise *Scito te ipsum*, having been published earlier, namely, in 1721. Cousin's collection, besides giving extracts from the theological work *Sic et Non* (an assemblage of opposite opinions on doctrinal points, culled from the Fathers as a basis for discussion), includes the *Dialectica*, commentaries on logical works of Aristotle, Porphyry, and Boëthius, and a fragment, *De Generibus et Speciebus*. The last-named work, and also the psychological treatise *De Intellectibus*, published apart by Cousin (in *Fragmens Philosophiques*, vol. ii.), are now considered upon internal evidence not to be by Abelard himself, but only to have sprung out of his school. A genuine work, the *Glossulae super Porphyrium*, from which M. de Rémusat, in his classical monograph *Abelard* (1845), has given extracts, remains in manuscript.

The general importance of Abelard lies in his having fixed more decisively than any one before him the scholastic manner of philosophising, with its object of giving a formally rational expression to the received ecclesiastical doctrine. However his own particular interpretations may have been condemned, they were conceived in essentially the same spirit as the general scheme of thought afterwards elaborated in the 13th century with approval from the heads of the church. Through him was prepared in the Middle Age the ascendancy of the philosophical authority of Aristotle, which became firmly established in the half-century after his death, when first the completed *Organon*, and gradually all the other works of the Greek thinker, came to be known in the schools: before his time it was rather upon the authority of Plato that the prevailing Realism sought to lean. As regards the central question of Universals, without having sufficient knowledge of Aristotle's views, Abelard yet, in taking middle ground between the extravagant Realism of his master, William of Champeaux, or of St Anselm, and the not less extravagant Nominalism (as we have it reported) of his other master, Roscellin, touched at more than one point the Aristotelian position. Along with Aristotle, also with Nominalists generally, he ascribed full reality only to the particular concretes; while, in opposition to the "*insana sententia*" of Roscellin, he declared the Universal to be no mere word (*vox*), but to consist, or (perhaps we may say) emerge, in the fact of predication (*sermo*). Lying in the middle between Realism and (extreme) Nominalism, this doctrine has often been spoken of as Conceptualism, but ignorantly so. Abelard, pre-eminently a logician, did not concern himself with the psychological question which the Conceptualists aim at deciding as to the mental subsistence of the Universal. Outside of his dialectic, it was in ethics that Abelard showed greatest activity of philosophical thought; laying very particular stress upon the subjective intention as determining, if not the moral character, at least the moral value, of human action. His thought in this direction, wherein he anticipated something of modern speculation, is the more remarkable because his scholastic successors accomplished least in the field of morals, hardly venturing to bring the principles and rules of conduct under pure philosophical discussion, even after the great ethical inquiries of Aristotle became fully known to them. (G. C. R.)

ABENCERRAGES, a family or faction that is said to have held a prominent position in the Moorish kingdom of Granada in the 15th century. The name appears to have been derived from the Yussuf ben-Serragh, the head of the tribe in the time of Mahommed VII., who did that sovereign good service in his struggles to retain the crown of which he was three times deprived. Nothing is known of the family with certainty; but the name is

familiar from the interesting romance of Gines Perez de Hita, *Guerras civiles de Granada*, which celebrates the feuds of the Abencerrages and the rival family of the Zegris, and the cruel treatment to which the former were subjected. Florian's *Gonsalvo of Cordova*, and Chateaubriand's *Last of the Abencerrages*, are imitations of Perez de Hita's work. The hall of the Abencerrages in the Alhambra takes its name from being the reputed scene of the massacre of the family.

ABENEZRA, or BEN EZRA, is the name ordinarily given to ABRAHAM BEN MEIR BEN EZRA (called also *Abenare* or *Evenare*), one of the most eminent of the Jewish literati of the Middle Ages. He was born at Toledo about 1090; left Spain for Rome about 1140; resided afterwards at Mantua (1145), at Lucca (1154), at Rhodes (1155 and 1166), and in England (1159); and died probably in 1168. He was distinguished as a philosopher, astronomer, physician, and poet, but especially as a grammarian and commentator. The works by which he is best known form a series of *Commentaries* on the books of the Old Testament, which have nearly all been printed in the great Rabbinic Bibles of Bomberg (1525-6), Buxtorf (1618-9), and Frankfurter (1724-7). Abenezra's commentaries are acknowledged to be of very great value; he was the first who raised biblical exegesis to the rank of a science, interpreting the text according to its literal sense, and illustrating it from cognate languages. His style is elegant, but is so concise as to be sometimes obscure; and he occasionally indulges in epigram. In addition to the commentaries, he wrote several treatises on astronomy or astrology, and a number of grammatical works.

ABENSBERG, a small town of Bavaria, 18 miles S.W. of Regensburg, containing 1300 inhabitants. Here Napoleon gained an important victory over the Austrians on the 20th of April 1809. The town is the *Abusina* of the Romans, and ancient ruins exist in its neighbourhood.

ABERAVON, a parliamentary and municipal borough of Wales, in the county of Glamorgan, beautifully situated on the Avon, near its mouth, 8 miles east of Swansea. The town and adjacent villages have increased rapidly in recent years, from the extension of the mines of coal and iron in the vicinity, and the establishment of extensive works for the smelting of tin, copper, and zinc. The harbour, Port Talbot, has been much improved, and has good docks; and there is regular steam communication with Bristol. Ores for the smelting furnaces are imported from Cornwall, and copper, tin, and coal are exported. Aberavon unites with Swansea, Kenfigg, Loughor, and Neath, in returning a member to Parliament. In 1871 the population of the parish was 3396, of the parliamentary borough, 11,906.

ABERCONWAY. See CONWAY.

ABERCROMBIE, JOHN, an eminent physician of Edinburgh, was the son of the Rev. George Abercrombie of Aberdeen, in which city he was born in 1781. After attending the Grammar School and Marischal College, Aberdeen, he commenced his medical studies at Edinburgh in 1800, and obtained his degree of M.D. there in 1803. Soon afterwards he went to London, and for about a year gave diligent attention to the medical practice and lectures in St George's Hospital. In 1804 he returned to Edinburgh, became a Fellow of the College of Surgeons, and commenced as general practitioner in that city; where, in dispensary and private practice, he laid the foundation of that character for sagacity as an observer of disease, and judgment in its treatment, that eventually elevated him to the head of his profession. In 1823, he became a Licentiate of the College of Physicians; in 1824, a Fellow of that body; and from the death of Dr Gregory in 1822, he was considered the first physician in Scotland. Aber-

crombie early began the laudable practice of preserving accurate notes of the cases that fell under his care; and at a period when pathological anatomy was far too little regarded by practitioners in this country, he had the merit of sedulously pursuing it, and collecting a mass of most important information regarding the changes produced by disease on different organs; so that, before the year 1824, he had more extended experience, and more correct views in this interesting field, than most of his contemporaries engaged in extensive practice. From 1816 he occasionally enriched the pages of the *Edinburgh Medical and Surgical Journal* with essays, that display originality and industry, particularly those "on the diseases of the spinal cord and brain," and "on diseases of the intestinal canal, of the pancreas, and spleen." The first of these formed the basis of his great and very original work, *Pathological and Practical Researches on Diseases of the Brain and Spinal Cord*, which appeared at Edinburgh in 1828. In the same year he published also another very valuable work, his *Researches on the Diseases of the Intestinal Canal, Liver, and other Viscera of the Abdomen*. Though his professional practice was very extensive and lucrative, he found time for other speculations and occupations. In 1830 he published his *Inquiries concerning the Intellectual Powers of Man and the Investigation of Truth*, a work which, though less original and profound than his medical speculations, contains a popular view of an interesting subject, expressed in simple language. It was followed in 1833 by a sequel, *The Philosophy of the Moral Feelings*, the object of which, as stated in the preface, was "to divest the subject of all improbable speculations," and to show "the important relation which subsists between the science of mind and the doctrines of revealed religion." Both works have been very extensively read, reaching the 18th and 14th editions respectively in 1869. Soon after the publication of *Moral Feelings*, the University of Oxford conferred on the author the honorary degree of Doctor of Medicine, and in 1835 he was elected Lord Rector of Marischal College, Aberdeen. Dr Abercrombie was much beloved by his numerous friends for the suavity and kindness of his manners, and was universally esteemed for his benevolence and unaffected piety. He died on the 14th of November 1844 of a very uncommon disease, the bursting (from softening of the muscular substance) of the coronary vessels of the heart.

ABERCROMBY, DAVID, M.D. This Scottish physician was sufficiently noteworthy half a century after his (probable) decease to have his *Nova Medicinæ Praxis* reprinted at Paris in 1740; while during his lifetime his *Tuta ac efficax huius veneræ sæpe absque mercurio ac semper absque salivatione mercuriali curando methodus* (1684, 8vo) was translated into German and published at Dresden in 1702 (8vo). In 1685 were published *De Pulsus Variatione* (London; Paris, 1688, 12mo), and *Ars explorandi medicas facultates plantarum ex solo sap.* (London). His *Opuscula* were collected in 1687. These professional writings gave him a place and memorial in Haller's *Bibliotheca Medicinæ Pract.* (4 vols. 8vo, 1779, tom. iii. p. 619); but he claims passing remembrance rather as a metaphysician by his remarkable controversial books in theology and philosophy. Formerly a Roman Catholic and Jesuit, he abjured Popery, and published *Protestancy proved Safer than Popery* (London, 1686). But by far the most noticeable of his productions is *A Discourse of Wit* (London, 1685). This treatise somehow has fallen out of sight—much as old coined gold gets hidden away—so that bibliographers do not seem to have met with it, and assign it at hap-hazard to Patrick Abercromby, M.D. Notwithstanding, the most cursory examination of it proves that in this *Discourse of Wit* are contained



some of the most characteristic and most definitely-put metaphysical opinions of the Scottish philosophy of common sense. Of this early metaphysician nothing biographically has come down save that he was a Scotchman ("Scotus")—born at Seaton. He was living early in the 18th century. (Haller, as *supra*; Lawrence Charteris's M.S., &c.) So recently as 1833 was printed *A Short Account of Scots Divines* by him, edited by James Maidment, Edinburgh. (A. B. G.)

ABERCROMBY, JAMES, LORD DUNFERMLINE, third son of the celebrated Sir Ralph Abercromby; was born on the 7th Nov. 1776. Educated for the profession of the law, he was called to the bar at Lincoln's Inn in 1801, but he was prevented from engaging to any considerable extent in general practice by accepting appointments, first as commissioner in bankruptcy, and subsequently, as steward of the estates of the Duke of Devonshire. He commenced his political career in 1807, when he was elected member of Parliament for the borough of Midhurst. His sympathies with the small and struggling Opposition had already been declared, and he at once attached himself to the Whig party, with which he consistently acted throughout life. In 1812 he was returned for Calne, which he continued to represent until his elevation to the Scotch bench in 1830. During this lengthened period he rendered conspicuous and valuable services to his party and the country. In Scotch affairs he took, as was natural, a deep interest; and, by introducing, on two separate occasions, a motion for the redress of a special glaring abuse, he undoubtedly gave a strong impulse to the growing desire for a general reform. In 1824, and again in 1826, he presented a petition from the inhabitants of Edinburgh, and followed it up by a motion "for leave to bring in a Bill for the more effectual representation of the city of Edinburgh in the Commons House of Parliament." The motion was twice rejected, but by such narrow majorities as showed that the monopoly of the self-elected Council of thirty-three was doomed. In 1827, on the accession of the Whigs to power under Mr. Canning, Abercromby received the appointment of Judge-Advocate-General and Privy Counsellor. In 1830 he was raised to the judicial bench as Chief Baron of the Exchequer in Scotland. The office was abolished in 1832; and almost contemporaneously, Edinburgh, newly enfranchised, was called to return two members to the first reformed Parliament. As the election marked the commencement of a new political era, the honour to be conferred possessed a peculiar value, and the choice of the citizens fell most appropriately on Francis Jeffrey and James Abercromby, two of the foremost of those to whom they were indebted for their hard-won privileges. In 1834 Mr Abercromby obtained a seat in the cabinet of Lord Grey as Master of the Mint. On the assembling of the new Parliament in 1835, the election of a speaker gave occasion for the first trial of strength between the Reform party and the followers of Sir Robert Peel. After a memorable division, in which more members voted than had ever before been known, Abercromby was elected by 316 votes, to 310 recorded for Manners-Sutton. The choice was amply justified, not only by the urbanity, impartiality, and firmness with which Abercromby discharged the public duties of the chair, but also by the important reforms he introduced in regard to the conduct of private business. In 1839 he resigned the office, and received the customary honour of a peerage, with the title of Lord Dunfermline. The evening of his life was passed in retirement at Colinton, near Edinburgh, where he died on the 17th April 1858. The courage and sagacity which marked his entire conduct as a Liberal were never more conspicuous than when, towards the close of his life, he availed himself of an opportunity of practically asserting his cherished doctrine of absolute religious equality. The

important part he took in originating and supporting the United Industrial School in Edinburgh for ragged children, irrespective of their religious belief, deserves to be gratefully acknowledged and remembered, even by those who took the opposite side in the controversy which arose with regard to it.

ABERCROMBY, PATRICK, M.D., was the third son of Alexander Abercromby of Fetterneir in Aberdeenshire, and brother of Francis Abercromby, who was created by James II. Lord Glasford. He was born at Forfar in 1656. As throughout Scotland, he could have had there the benefits of a good parish school; but it would seem from after events that his family was Roman Catholic, and hence, in all probability, his education was private. This, and not the unproved charge of perversion from Protestantism in subserviency to James II., explains his Roman Catholicism and adhesion to the fortunes of that king. But, intending to become a doctor of medicine, he entered the University of St Andrews, where he took his degree of M.D. in 1685. From a statement in one of his preface-epistles to his *magnum opus*, the *Martial Achievements of the Scots Nation*, he must have spent most of his youthful years abroad. It has been stated that he attended the University of Paris. The *Discourse of Wit* (1685), assigned to him, belongs to Dr David Abercromby, a contemporary. On his return to Scotland, he is found practising as a physician in Edinburgh, where, besides his professional duties, he gave himself with characteristic zeal to the study of antiquities, a study to which he owes it that his name still lives, for he finds no place in either Haller or Hutchison's *Medical Biographies*. He was out-and-out a Scot of the old patriotic type, and, living as he did during the agitations for the union of England and Scotland, he took part in the war of pamphlets inaugurated and sustained by prominent men on both sides of the Border. He crossed swords with no less redoubtable a foe than Daniel Defoe in his *Advantages of the Act of Security, compared with those of the intended Union* (Edinburgh, 1707), and *A Vindication of the Same against Mr De Foe* (*ibid.*) The logic and reason were with Defoe, but there was a *sentiment* in the advocates of independence which was not sufficiently allowed for in the clamour of debate; and, besides, the disadvantages of union were near, hard, and actual, the advantages remote, and contingent on many things and persons. Union wore the look to men like Abercromby and Lord Belhaven of absorption, if not extinction. Abercromby was appointed physician to James II., but the Revolution deprived him of the post. Crawford (in his *Peerage*, 1716) ascribes the title of Lord Glasford to an intended recognition of ancestral loyalty; its bestowment in 1685 corresponding with the younger brother's graduation as M.D., may perhaps explain his appointment. A minor literary work of Abercromby's was a translation of M. Beague's partizan History (so called) of the War carried on by the Popish Government of Cardinal Beaton, aided by the French, against the English under the Protector Somerset, which appeared in 1707. The work with which Abercromby's name is permanently associated is his already noticed *Martial Achievements of the Scots Nation*, issued in two noble folios, vol. i. 1711, vol. ii. 1716. In the title-page and preface to vol. i. he disclaims the ambition of being an historian, but in vol. ii., in title-page and preface alike, he is no longer a simple biographer, but an historian. That Dr Abercromby did not use the word "genuine history" in his title-page without warrant is clear on every page of his large work. Granted that, read in the light of after researches, much of the first volume must necessarily be relegated to the region of the mythical, none the less was the historian a laborious and accomplished reader and investigator of all available authorities, as well manuscript as

printed; while the roll of names of those who aided him includes every man of note in Scotland at the time, from Sir Thomas Craig and Sir George Mackenzie to Mr Alexander Nisbet and Mr Thomas Ruddiman. The *Martial Achievements* has not been reprinted, though practically the first example of Scottish typography in any way noticeable, vol. ii. having been printed under the scholarly supervision of Thomas Ruddiman. The date of his death is uncertain. It has been variously assigned to 1715, 1716, 1720, and 1726, and it is usually added that he left a widow in great poverty. That he was living in 1716 is certain, as Crawford speaks of him (in his *Peerage*, 1716) as "my worthy friend." Probably he died about 1716. *Memoirs of the Abercrombys*, commonly given to him, does not appear to have been published. (Chambers's *Eminent Scotsmen*, s. v.; Anderson's *Scottish Nation*, s. v.; Chalmers's *Biog. Dict.*, s. v.; Chalmers's *Life of Ruddiman*; Haller's *Bibliotheca Medicinæ Pract.*, 4 vols. 4to, 1779; Hutchinson's *Biog. Medical*, 2 vols. 8vo, 1799; Lee's *Defoe*, 3 vols. 8vo.)

(A. B. G.)

ABERCROMBY, SIR RALPH, K.B., Lieutenant-General in the British army, was the eldest son of George Abercromby of Tullibody, Clackmannanshire, and was born in October 1734. After passing some time at an excellent school at Alloa, he went to Rugby, and in 1752-53 he attended classes in Edinburgh University. In 1754 he was sent to Leipsic to study civil law, with a view to his proceeding to the Scotch bar, of which it is worthy of notice that both his grandfather and his father lived to be the oldest members. On returning from the Continent he expressed a strong preference for the military profession, and a cornet's commission was accordingly obtained for him (March 1756) in the 3d Dragoon Guards. He rose through the intermediate gradations to the rank of lieutenant-colonel of the regiment (1773), and in 1781 he became colonel of the 103d infantry. When that regiment was disbanded in 1783 he retired upon half-pay. That up to this time he had scarcely been engaged in active service, was owing mainly to his disapproval of the policy of the Government, and especially to his sympathies with the American colonists in their struggles for independence; and his retirement is no doubt to be ascribed to similar feelings. But on France declaring war against England in 1793, he hastened to resume his professional duties; and, being esteemed one of the ablest and most intrepid officers in the whole British forces, he was appointed to the command of a brigade under the Duke of York, for service in Holland. He commanded the advanced guard in the action on the heights of Cateau, and was wounded at Nimeguen. The duty fell to him of protecting the British army in its disastrous retreat out of Holland, in the winter of 1794-5. In 1795 he received the honour of knighthood, the Order of the Bath being conferred on him in acknowledgment of his services. The same year he was appointed to succeed Sir Charles Grey, as commander-in-chief of the British forces in the West Indies. In 1796, Grenada was suddenly attacked and taken by a detachment of the army under his orders. He afterwards obtained possession of the settlements of Demerara and Essequibo, in South America, and of the islands of St Lucia, St Vincent, and Trinidad. He returned in 1797 to Europe, and, in reward for his important services, was appointed to the command of the regiment of Scots Greys, intrusted with the governments of the Isle of Wight, Fort George, and Fort Augustus, and raised to the rank of lieutenant-general. He held, in 1797-8, the chief command of the forces in Ireland. There he laboured to maintain the discipline of the army, to suppress the rising rebellion, and to protect the people from military oppression, with a care worthy alike of a great general and an enlightened

and beneficent statesman. When he was appointed to the command in Ireland, an invasion of that country by the French was confidently anticipated by the English Government. He used his utmost efforts to restore the discipline of an army that was utterly disorganised; and, as a first step, he anxiously endeavoured to protect the people, by re-establishing the supremacy of the civil power, and not allowing the military to be called out, except when it was indispensably necessary for the enforcement of the law and the maintenance of order. Finding that he received no adequate support from the head of the Irish Government, and that all his efforts were opposed and thwarted by those who presided in the councils of Ireland, he resigned the command. His departure from Ireland was deeply lamented by the reflecting portion of the people, and was speedily followed by those disastrous results which he had anticipated, and which he so ardently desired and had so wisely endeavoured to prevent. After holding for a short period the office of Commander-in-Chief in Scotland, Sir Ralph, when the enterprise against Holland was resolved upon in 1799, was again called to command under the Duke of York. The difficulties of the ground, the inclemency of the season, unavoidable delays, the disorderly movements of the Russians, and the timid duplicity of the Dutch, defeated the objects of that expedition. But it was confessed by the Dutch, the French, and the British alike, that even victory the most decisive could not have more conspicuously proved the talents of this distinguished officer. His country applauded the choice, when, in 1801, he was sent with an army to dispossess the French of Egypt. His experience in Holland and the West Indies particularly fitted him for this new command, as was proved by his carrying his army in health, in spirits, and with the requisite supplies, in spite of very great difficulties, to the destined scene of action. The debarkation of the troops at Aboukir, in the face of an opposing force, is justly ranked among the most daring and brilliant exploits of the English army. A battle in the neighbourhood of Alexandria (March 21, 1801) was the sequel of this successful landing, and it was Sir R. Abercromby's fate to fall in the moment of victory. He was struck by a spent ball, which could not be extracted, and died seven days after the battle. The Duke of York paid a just tribute to the great soldier's memory in the general order issued on the occasion of his death:—"His steady observance of discipline, his ever-watchful attention to the health and wants of his troops, the persevering and unconquerable spirit which marked his military career, the splendour of his actions in the field, and the heroism of his death, are worthy the imitation of all who desire, like him, a life of heroism and a death of glory." By a vote of the House of Commons, a monument was erected in honour of Sir Ralph Abercromby in St Paul's Cathedral. His widow was created a peeress, and a pension of £2000 a year was settled on her and her two successors in the title. It may be mentioned that Abercromby was returned, after a keen contest, as member of Parliament for his native county of Clackmannanshire in 1773; but a parliamentary life had no attractions for him, and he did not seek re-election. A memoir of the later years of his life (1793-1801), by his son, Lord Dunfermline, was published in 1861.

ABERDARE, a town of Wales, in the county of Glamorgan, on the right bank of the river Cynon, four miles S.W. of Merthyr-Tydvil. The district around is rich in valuable mineral products, and coal and iron mining are very extensively carried on in the neighbourhood. Important tin-works, too, have been recently opened. Part of the coal is used at the iron-works, and large quantities are sent to Cardiff for exportation. Aber-



dare is connected with the coast by canal and railway. Owing to the great development of the coal and iron trade, it has rapidly increased from a mere village to a large and flourishing town. Handsome churches, banks, and hotels have been erected, a good supply of water has been introduced, and a public park has been opened. Two markets are held weekly. The whole parish falls within the parliamentary borough of Merthyr-Tydvil. The rapid growth of its population is seen by the following figures: in 1841 the number of inhabitants was 6471; in 1851, 14,999; in 1861, 32,299; and in 1871, 37,774.

ABERDEEN, a royal burgh and city, the chief part of a parliamentary burgh, the capital of the county of Aberdeen, the chief seaport in the north of Scotland, and the fourth Scottish town in population, industry, and wealth. It lies in lat. 57° 9' N. and long. 2° 6' W., on the German Ocean, near the mouth of the river Dee, and is 542 miles north of London, and 111 miles north of Edinburgh; by the shortest railway routes.



Aberdeen, probably the Devana on the Diva of Ptolemy, was an important place in the 12th century. William the Lion had a residence in the city, to which he gave a charter in 1179, confirming the corporate rights granted by David I. The city received many subsequent royal charters. It was burned by Edward III. in 1336, but it was soon rebuilt and extended, and called New Aberdeen. The houses were of timber and thatched, and many such existed till 1741. The burgh records are the oldest of any Scottish burgh. They begin in 1398, and are complete to the present time, with only a short break. Extracts from them, extending from 1398 to 1570, have been published by the Spalding Club. For many centuries the city was subject to attacks by the barons of the surrounding districts, and its avenues and six ports had to be guarded. The ports had all been removed by 1770. Several monasteries existed in Aberdeen before the Reformation. Most of the Scottish sovereigns visited the

city and received gifts from the authorities. In 1497 a blockhouse was built at the harbour mouth as a protection against the English. During the religious struggle in the 17th century between the Royalists and Covenanters the city was plundered by both parties. In 1715 Earl Marischal proclaimed the Pretender at Aberdeen. In 1745 the Duke of Cumberland resided a short time in the city. In the middle of the 18th century boys were kidnapped in Aberdeen, and sent as slaves to America. In 1817 the city became insolvent, with a debt of £225,710, contracted by public improvements, but the debt was soon paid off. The motto on the city arms is Bon-Accord. It formed the watchword of the Aberdonians while aiding King Robert the Bruce in his battles with the English.

Of eminent men connected with Aberdeen, New and Old, may be mentioned—John Barbour, Hector Boece or Boethius, Bishop Elphinstone, the Earls Marischal; George Jamesone, the famous portrait painter; Edward Raban, the first printer in Aberdeen, 1622; Rev. Andrew Cant, the Covenanter; David Anderson (Davie do a' thing), a mechanic; James Gregory, inventor of the reflecting telescope; Dr Thomas Reid, the metaphysician; Dr George Campbell, Principal of Marischal College, author of several important works, and best known by his *Philosophy of Rhetoric*; Dr James Beattie; Lord Byron; Sir James Mackintosh; Robert Hall; Dr R. Hamilton, who wrote on the National Debt.

Till 1800 the city stood on a few eminences, and had steep, narrow, and crooked streets, but, since the Improvement Act of that year, the whole aspect of the place has been altered by the formation of two new spacious and nearly level streets (Union Street and King Street, meeting in Castle Street), and by the subsequent laying out of many others, besides squares, terraces, &c., on nearly flat ground. The city is above eight miles in circuit, and is built on sand, gravel, and boulder clay. The highest parts are from 90 to 170 feet above the sea. The chief thoroughfare is Union Street, nearly a mile long and 70 feet broad. It runs W.S.W. from Castle Street, and crosses the Denburn, now the railway valley, by a noble granite arch 132 feet in span and 50 feet high, which cost, with a hidden arch on each side, £13,000.

Aberdeen is now a capacious, elegant, and well-built public town, and from the material employed, consisting chiefly of light grey native granite, is called the "granite city." It contains many fine public buildings. The principal of these is Marischal College or University Buildings, which stands on the site of a pre-Reformation Franciscan Convent, and was rebuilt, 1836-1841, at a cost of about £30,000. It forms three sides of a court, which is 117 by 105 feet, and has a back wing, and a tower 100 feet high. The accommodation consists of twenty-five large class-rooms and laboratories, a hall, library, museums, &c.

The University of Aberdeen was formed by the union and incorporation, in 1860, by Act of Parliament, of the University and King's College of Aberdeen, founded in Old Aberdeen, in 1494, by William Elphinstone, Bishop of Aberdeen, under the authority of a Papal bull obtained by James IV., and of the Marischal College and University of Aberdeen, founded in New Aberdeen, in 1593, by George Keith, Earl Marischal, by a charter ratified by Act of Parliament. The officials consist of a chancellor, with rector and principal; there are 21 professors and 8 assistants. Arts and divinity are taught in King's College, and medicine, natural history, and law in Marischal College. The arts session lasts from the end of October to the beginning of April. The arts curriculum of four years, with graduation, costs £36, 11s. There are 214 arts bursaries, 29 divinity, and 1 medical, of the aggregate annual value of £3646, £650, and £26, respectively. About 60 arts

bursaries, mostly from £10 to £35 in value, are given yearly by competition, or by presentation and examination. Two-thirds of the arts students are bursars. Seventeen annual scholarships and prizes of the yearly value of £758 are given at the end of the arts curriculum. The average yearly number of arts students, in the thirteen years since the union of the arts classes of the two colleges in 1860, has been 342, while in the separate colleges together for the nine years before the union, it was 431. In winter session 1872-73 there were 623 matriculated students in all the faculties. In 1872, 32 graduated in arts, 68 in medicine, 5 in divinity, and 1 in law. The library has above 80,000 volumes. The General Council in 1873 had 2075 registered members, who, with those of Glasgow University, return one member to Parliament.

The Free Church Divinity College was built in 1850, at the cost of £2025, in the Tudor-Gothic style. It has a large hall, a library of 12,000 volumes, and 15 bursaries of the yearly value of from £10 to £25.

At the east end of Union Street, and partly in Castle Street, on the north side, are the new County and Municipal buildings, an imposing Franco-Scottish Gothic pile, 225 feet long, 109 feet broad, and 64 feet high, of four stories, built 1867-1873 at the cost of £80,000, including £25,000 for the site. Its chief feature is a tower 200 feet high. It contains a great hall, 74 feet long, 35 feet broad, and 50 feet high, with an open timber ceiling; a Justiciary Court-House, 50 feet long, 37 feet broad, and 31 feet high; a Town Hall, 41 feet long, 25 feet broad, and 15 feet high, and a main entrance corridor 60 feet long, 16 feet broad, and 24 feet high. A little to the west is the Town and County Bank, a highly ornamented building inside and outside, in the Italian style, costing about £24,000.

A very complete closed public market of two floors was built in 1842, at a cost of £28,000, by a company incorporated by Act of Parliament. The upper floor or great hall is 315 feet long, 106 feet broad, and 45 feet high, with galleries all round. The lower floor is not so high. The floors contain numerous small shops for the sale of meat, fowls, fish, &c., besides stalls and seats for the sale of vegetables, butter, eggs, &c. The galleries contain small shops for the sale of drapery, hardware, fancy goods, and books. On the upper floor is a fountain of polished Peter-head granite, costing £200, with a basin 7½ feet diameter, cut out of one block of stone. Connected with this undertaking was the laying out of Market Street from Union Street to the quay. At the foot of this street is being built in the Italian style the new post and telegraph office, at a cost of £16,000, including £4000, the cost of the site. It is to form a block of about 100 feet square and 40 feet high.

Aberdeen has about 60 places of worship, with nearly 48,000 sittings. There are 10 Established churches; 20 Free, 6 Episcopalian, 6 United Presbyterian, 5 Congregational, 2 Baptist, 2 Methodist, 2 Evangelical Union, 1 Unitarian, 1 of Roman Catholic, 1 of Friends, and 1 of Original Seceders. There are also several mission chapels. In 1843 all the Established ministers seceded, with 10,000 lay members. The Established and Free Church denominations have each about 11,000 members in communion. The Established West and East churches, in the centre of the city, within St Nicholas churchyard, form a continuous building 220 feet long, including an intervening aisle, over which is a tower and spire 140 feet high. The West was built in 1775 in the Italian style, and the East in 1834 in the Gothic, each costing about £5000. They occupy the site of the original cruciform church of St Nicholas, erected in the 13th, 14th, and 15th centuries. One of the nine bells in the tower bears the date of 1362, and is 4 feet

diameter at the mouth, 3½ feet high, and very thick. The Union Street front of the churchyard is occupied by a very elegant granite façade, built in 1830, at the cost of £1460. It is 147½ feet long, with a central arched gateway and entablature 32½ feet high, with two attached Ionic columns on each side. Each of the two wings has six Ionic columns (of single granite blocks, 15 feet 2 inches long), with basement and entablature, the whole being 23½ feet high. The following are the style, cost, and date of erection of the other principal Aberdeen churches—St Andrew's, Episcopal, Gothic, £6000, 1817; North Church, Established, Greek, £10,000, 1831; three churches in a cruciform group, Free, simple Lancet Gothic, with a fine brick spire 174 feet high, £5006, 1844; Roman Catholic, Gothic, £12,000, 1859; Free West, Gothic, £12,856, 1869, with a spire 175 feet high.

In 1873 there were in Aberdeen about 110 schools, with from 10,000 to 11,000 pupils in attendance. About 2500 students attend the University, Mechanics' Institution, and private schools for special branches.

Five miles south-west of Aberdeen, on the south side of the Dee, in Kincardineshire, is St Mary's Roman Catholic College of Blairs, with a president and three professors.

The Aberdeen Grammar School, dating from about 1263, is a preparatory school for the university. It has a rector and four regular masters, who teach classics, English, arithmetic, and mathematics, for the annual fee of £4, 10s. for each pupil. Writing, drawing, &c., are also taught. Nearly 200 pupils attend, who enter about the age of twelve. Like the Edinburgh High School, it has no elementary department. There are 30 bursaries. A new granite building for the school was erected, 1861-1863, in the Scotch baronial style, at the cost of £16,000, including site. It is 215 feet long and 60 feet high, and has three towers.

The Mechanics' Institution, founded 1824, and reorganised 1834, has a hall, class-rooms, and a library of 14,000 volumes, in a building erected in 1846, at a cost of £3500. During the year 1872-73, there were at the School of Science and Art 385 pupils; and at other evening classes, 538.

Aberdeen has two native banks, besides branch banks, Banks, &c. and a National Security Savings Bank; three insurance companies, four shipping companies, three railway companies, and a good many miscellaneous companies. There are ten licensed pawnbroking establishments, with about 440,000 pledges in the year for £96,000, and with a capital of £27,000. There are seven incorporated trades, originating between 1398 and 1527, and having charitable funds for decayed members, widows, and orphans. They have a hall, built in 1847 for £8300, in the Tudor Gothic style. The hall, 60 feet long, 29 wide, and 42 high, contains curious old chairs, and curious inscriptions on the shields of the crafts.

Among the charitable institutions is Gordon's Hospital, Charities, founded in 1729 by a miser, Robert Gordon, a Dantzic merchant, of the Straloch family, and farther endowed by Alexander Simpson of Collyhill in 1816. It is managed by the Town Council and four of the Established ministers of Aberdeen, incorporated by royal charters of 1772 and 1792. The central part of the house was built in 1739, and the wings in 1830-1834, the whole costing £17,300, and being within a garden of above four acres. It now (1873) maintains and educates (in English, writing, arithmetic, physics, mathematics, drawing, music, French, &c.) 180 boys of the age 9 to 15, the sons and grandsons of decayed burgesses of guild and trade of the city; and next those of decayed inhabitants (not paupers). Expenditure for year to 31st October 1872, £4353 for 164 boys. It has a head-master, three regular, and several visiting



masters. The Boys' and Girls' Hospital, lately built for £10,000, maintains and educates 50 boys and 50 girls.

The Female Orphan Asylum, founded by Mrs Elmslie, in 1840, and managed by trustees, maintains and educates, chiefly as domestic servants, 45 girls between the ages of 4 and 16, at the yearly cost for each of about £23, 13s. Those admitted must be legitimate orphan daughters of respectable parents, who have lived three years immediately before death in Aberdeen or in the adjoining parishes of Old Machar and Nigg. The Hospital for Orphan and Female Destitute Children, endowed by John Carnegie and the trustees of the Martle Fund, maintains and educates 50 girls, chiefly for domestic service. The Asylum for the Blind, established in 1843, on a foundation by Miss Cruickshank, maintains and educates about 10 blind children, and gives industrial employment to blind adults. There is a boys' and girls' school for 150 boys and 150 girls on Dr Bell's foundation. The Industrial Schools, begun by Sheriff Watson in 1841, and the Reformatory Schools, begun in 1857, having some 600 pupils on the roll, have greatly diminished juvenile crime in the district. The Martle or John Gordon's Charitable Fund, founded in 1815, has an annual revenue from land of about £2400, applicable to all kinds of charity, in sums from £5 to £300. The Midbeltie Fund, founded by a bequest of £20,000, in 1848, by James Allan of Midbeltie, gives yearly pensions ranging from £5 to £15 to respectable decayed widows in the parishes of St Nicholas and Old Machar.

The two parishes in which Aberdeen is situated, viz., St Nicholas and Old Machar, have each a large poor-house. The poor of both parishes cost about £20,000 a year.

The Royal Infirmary, instituted in 1740, was rebuilt 1833-1840, in the Grecian style, at the cost of £17,000. It is a well-situated, large, commodious, and imposing building. It has three stories, the front being 166 feet long and 50 feet high, with a dome. A detached fever-house was built in 1872 for about £2500. The managers were incorporated by royal charter in 1773, and much increased in number in 1852. The institution is supported by land rents, feu-duties, legacies, donations, subscriptions, church collections, &c. Each bed has on an average 1200 cubic feet of space. There are on the average 130 resident patients, costing each on the average a shilling daily, and the number of patients treated may be stated at 1700 annually, besides outdoor patients receiving advice and medicine. The recent annual expenditure has been about £4300. There is a staff of a dozen medical officers.

The Royal Lunatic Asylum, opened in 1800, consists of two separate houses, valued in 1870 at £40,000, in an enclosure of 40 acres. It is under the same management as the Infirmary. The recent daily average of patients has been about 420, at an annual cost of £13,000. The annual rate for each pauper is £25, 10s. The General Dispensary, Vaccine, and Lying-in Institution, founded in 1823, has had as many as 6781 cases in one year. The Hospital for Incurables has a daily average of 26 patients, and the Ophthalmic and Auric Institution has had 671 cases in a year.

The Music Hall, built in 1821 and 1859 at the cost of £16,500, has a front 90 feet long, with a portico of 6 Ionic pillars 30 feet high; large, highly-decorated lobbies and rooms; and a hall 150 feet long, 68 broad, and 50 high, with a flat ceiling, and galleries. The hall holds 2000 persons seated, and has a fine organ and an orchestra for 300. Here H.R.H. Prince Albert opened the British Association, as president, 14th September 1859. A new Theatre and Opera House was built in 1872, in the mixed Gothic style, for £8400, with the stage 52½ feet by 29, and the auditorium for 1700 to 1800 persons. The front wall is of bluish granite and red and yellow freestone, with

some polished Peterhead granite pillars, the rest being built of concrete.

In Castle Street, the City Place and Old Market Stance, Market is the Market Cross, a beautiful, open-arched, hexagonal structure of freestone, 21 feet diameter, and 18 feet high. It has Ionic columns and pilasters, and an entablature of twelve panels. On ten of the panels are medallions, cut in stone, in high relief, of the Scottish sovereigns from James I. to James VII. From the centre rises a composite column 12½ feet high, with a Corinthian capital, on which is the royal unicorn rampant. This cross was planned and erected about 1682 by John Montgomery, a native architect, for £100 sterling. On the north side of the same street, adjoining the municipal buildings, is the North of Scotland Bank, a Grecian building in granite, with a portico of Corinthian columns, having most elaborately carved capitals. On an eminence east of Castle Street are the military barracks for 600 men, built in 1796 for £16,000.

The principal statues in the city are those of the last Duke of Gordon—died 1836—in grey granite, 10 feet high; Queen Victoria, in white Sicilian marble, 8½ feet high; Prince Albert, bronze, natural-size, sitting posture; and a curious rough stone figure, of unknown date, supposed to be Sir William Wallace.

The Dee to the south of the city is crossed by three bridges, the old bridge of Dee, an iron suspension bridge, and the Caledonian Railway bridge. The first, till 1832 the only access to the city from the south, consists of seven semicircular ribbed arches, is about 30 feet high, and was built early in the 16th century by Bishops Elphinstone and Dunbar. It was nearly all rebuilt 1718-1723, and from being 14½ feet wide, it was in 1842 made 26 feet wide. From Castle Street, King Street leads in the direction of the new bridge of Don (a little east of the old "Brig o' Balgownie"), of five granite arches, each 75 feet span, built for nearly £13,000 in 1827-1832.

A defective harbour, and a shallow sand and gravel bar at its entrance, long retarded the trade of Aberdeen, but, under various Acts since 1773, they have been greatly deepened. The north pier, built partly by Smeaton, 1775-1781, and partly by Telford, 1810-1815, extends 2000 feet into the German Ocean. It is 30 feet broad, and, with the parapet, rises 15 feet above high water. It consists of large granite blocks. It has increased the depth of water on the bar from a few feet to 22 or 24 feet at spring tides, and to 17 or 18 feet at neap. The wet dock, of 29 acres, and with 6000 feet of quay, was completed in 1848, and called Victoria Dock, in honour of Her Majesty's visit to the city in that year. These and other improvements of the harbour and its entrance cost £326,000 down to 1848. By the Harbour Act of 1868, the Dee near the harbour has been diverted to the south, at the cost of £80,000, and 90 acres of new ground (in addition to 25 acres formerly made up) for harbour works are being made up on the city or north side of the river; £80,000 has been laid out in forming in the sea, at the south side of the river, a new breakwater of concrete, 1050 feet long, against south and south-east storms. The navigation channel is being widened and deepened, and the old pier or breakwater on the north side of the river mouth is to be lengthened at least 500 feet seaward. A body of 31 commissioners manage the harbour affairs.

Aberdeen Bay affords safe anchorage with off-shore winds, but not with those from the N.E., E., and S.E. On the Girdleness, the south point of the bay, a Lighthouse was built in 1833, in lat. 57° 8' N., and long. 2° 3' W., with two fixed lights, one vertically below the other, and respectively 115 and 185 feet above mean tide. There are also fixed leading lights to direct ships entering the harbour.

at night. In fogs, a steam whistle near the lighthouse is sounded ten seconds every minute. Near the harbour mouth are three batteries mounting nineteen guns.

Water.

The water supplied to the city contains only  $3\frac{1}{2}$  grains solid matter in a gallon, with a hardness of about 2 degrees. It is brought by gravitation, in a close brick culvert, from the Dee, 21 miles W.S.W. of the city, to a reservoir, which supplies nine-tenths of the city. The other tenth, or higher part of the city, is supplied by a separate reservoir, to which part of the water from the culvert is forced up by a hydraulic engine. Nearly 40 gallons water per head of the population are consumed daily for all purposes. The new water works cost £160,000, and were opened by Her Majesty, 16th October 1866.

The gas is made of canal coal, and is sent through 71 miles of main pipes, which extend 5 miles from the works.

Manufactures, &c.

The manufactures, arts, and trade of Aberdeen and vicinity are large and flourishing. Woollens were made as early as 1701, and knitting of stockings was a great industry in the 18th century. There are two large firms in the woollen trade, with 1550 hands, at £1000 weekly wages, and making above 1560 tons wool in the year into yarns, carpets, hand-knit hosiery, cloths, and tweeds. The linen trade, much carried on since 1749, is now confined to one firm, with 2600 hands, at £1200 wages weekly, who spin, weave, and bleach 50 tons flax and 60 tons tow weekly, and produce yarns, floorcloths, sheetings, dowlas, ducks, towels, sail-canvas, &c. The cotton manufacture, introduced in 1779, employs only one firm, with 550 hands, at £220 weekly wages, who spin 5000 bales of cotton a-year into mule yarn. The winery trade, begun in 1839, employs 400 hands, at £200 weekly wages, who make 2,100,000 yards cloth, 27 to 36 inches broad, in the year. Paper, first made here in 1696, is now manufactured by three firms in the vicinity. The largest has 2000 hands, at £1250 weekly wages, and makes weekly 75 to 80 tons of writing paper, and  $6\frac{1}{2}$  millions of envelopes, besides much cardboard and stamped paper; another firm makes weekly 77 tons coarse and card paper; and a third, 20 tons printing and other paper. The comb works of Messrs Stewart & Co., begun in 1827, are the largest in the world, employing 900 hands, at £500 weekly wages, who yearly convert 1100 tons horns, hoofs, india-rubber, and tortoise-shells into 11 millions of combs, besides spoons, cups, scoops, paper-knives, &c. Seven iron foundries and many engineering works employ 1000 men, at £925 weekly wages, and convert 6000 tons of iron a-year into marine and land steam engines and boilers, corn mills, wood-preparing machinery, machinery to grind and prepare artificial manures, besides sugar mills and frames and coffee machinery for the colonies.

The Sandilands Chemical Works, begun in 1848, cover five acres, and employ over 100 men and boys, at £90 to £100 weekly wages. Here are prepared naphtha, benzole, creosote oil, pitch, asphalt, sulphate of ammonia, sulphuric acid, and artificial manures. Paraffin wax and ozokerite are refined. An Artesian well within the works, 421 feet deep, gives a constant supply of good water, always at 51° Fahr. Of several provision-curing works, the largest employs 300 hands, chiefly females, in preserving meats, soups, sauces, jams, jellies, pickles, &c., and has in connection with it, near the city, above 230 acres of fruit, vegetable, and farm ground, and a large piggery. The products of the breweries and distilleries are mostly consumed at home. A large agricultural implement work employs 70 or 80 men and boys. Nearly 200 acres of ground, within three miles of the city, are laid out in rearing shrub and forest-tree seedlings. In 1872 about 145 acres of strawberries were reared within three miles of Aberdeen, and 80 tons of this fruit are said to have been exported.

Very durable grey granite has been quarried near Aber-Granite.

deen for 300 years, and blocked and dressed paving, kerb, and building granite stones have long been exported from the district. In 1764, Aberdeen granite pavement was first used in London. About the year 1795, large granite blocks were sent for the Portsmouth docks. The chief stones of the New Thames Embankment, London, are from Kemnay granite quarries, 16 miles north-west of the city. Aberdeen is almost entirely built of granite, and large quantities of the stone are exported to build bridges, wharfs, docks, lighthouses, &c., elsewhere. Aberdeen is famed for its polishing-works of granite, especially grey and red. They employ about 1500 hands in polishing vases, tables, chimney-pieces, fountains, monuments, columns, &c., for British and foreign demand. Mr Alexander Macdonald, in 1818, was the first to begin the granite polishing trade, and the works of the same firm, the only ones of the kind till about 1850, are still the largest in the kingdom.

In 1820, 15 vessels from Aberdeen were engaged in the Fishing, northern whale and seal fishing; in 1860, one vessel, but none since. The white fishing at Aberdeen employs some 40 boats, each with a crew of 5 men. Of the 900 tons wet fish estimated to be brought to market yearly, above a third are sent fresh by rail to England. The salmon caught in the Dee, Don, and sea are nearly all sent to London fresh in ice. The herring fishing has been prosecuted since 1836, and from 200 to 350 boats are engaged in it.

Aberdeen has been famed for shipbuilding, especially Shipbuilding for its fast clippers. Since 1855 nearly a score of vessels have been built of above 1000 tons each. The largest vessel (a sailing one) ever built here was one in 1855, of 2400 tons. In 1872 there were built 11 iron vessels of 9450 tons, and 6 wooden of 2980 tons, consuming 5900 tons iron, and costing £252,700, including £70,700 for engines and other machinery. 1400 hands were employed in shipbuilding in that year, at the weekly wages of about £1230.

In 1872, there belonged to the port of Aberdeen 236 Shipping vessels, of 101,188 tons, twenty-four of the vessels, of 7483 tons, being steamers. They trade with most British and Irish ports, the Baltic and Mediterranean ports, and many more distant regions. In 1872, 434,108 tons shipping arrived at the port, and the custom duties were £112,414. The export trade, exclusive of coasting, is insignificant. The shore or harbour dues were £126 in 1765, and £1300 in 1800. In the year ending 30th September 1872, they were £25,520; while the ordinary harbour revenue was £37,765, expenditure £28,598, and debt £324,614. The introduction of steamers in 1821 greatly promoted industry and traffic, and especially the cattle trade of Aberdeenshire with London. These benefits have been much increased by the extension of railway ys. Commodious steamers ply regularly between Aberdeen and London, Hull, Newcastle, Leith, Wick, Kirkwall, and Lerwick.

The joint railway station for the Caledonian, Great North of Scotland, and Deeside lines, was opened 1867, and is a very handsome erection, costing about £26,000. It is 500 feet long, and 102 feet broad, with the side walls 32 feet high. The arched roof of curved lattice-iron ribs, covered with slate, zinc, and glass, is all in one span, rising 72 feet high, and is very light and airy.

The Medico-Chirurgical Society of Aberdeen was founded in 1789. The hall was built in 1820 at a cost of £4000, and is adorned with an Ionic portico of four granite columns, 27 feet high. It has 42 members, and a library of 5000 volumes. The legal practitioners of Aberdeen have been styled advocates since 1633, and received royal charters in 1774, 1779, and 1862. They form a society, called the Society of Advocates, of 127 members in 1873, with a

Railway Station.

Societies.



hall built in 1871 for £5075, a library of nearly 6000 volumes, and a fund to support decayed and indigent members, and their nearest relatives. The revenue in 1872 was £2880.

**Press.** Aberdeen has one daily and three weekly newspapers. The *Aberdeen Journal*, established in 1748, is the oldest newspaper north of the Forth.

**Public Parks.** The places of out-door recreation and amusement are chiefly the following:—The Links, a grassy, benty, and sandy tract, 2 miles long and  $\frac{1}{2}$  to  $\frac{3}{4}$  mile broad, along the shore between the mouths of the Dee and the Don. It is mostly only a few feet above the sea, but the Broad Hill rises to 94 feet. Cattle shows, reviews, &c., are held on the Links. To the north-west of the town, a Public Recreation Park of 13 acres was laid out in 1872, at the cost of £3000, with walks, grass, trees, shrubs, and flowers.

**Climate.** Daily observations from 1857 to 1872 show the mean temperature of Aberdeen for the year to be 45° 8 Fahr., for the three summer months 56° Fahr., and for the three winter months 37° 3. The average yearly rainfall is 30·57 inches. Aberdeen is the healthiest of the large Scottish towns. East winds prevail in spring.

Since 1867 £50,000 has been spent in constructing main sewers throughout the city. A few acres of farm land have been irrigated by part of the sewage.

**Municipality.** The city is governed by a corporation, the magistrates and town council, consisting of twenty-five councillors, including a provost, six bailies, a dean of guild, a treasurer, &c. The corporation revenue in the year 1871–72 was £11,498. The police, water, and gas are managed by the council. The municipal and police burgh has an area of nearly three square miles, with 12,514 municipal electors, and with assessable property valued at £230,000 in 1873. The Parliamentary burgh has an area of nine square miles, including Old Aberdeen and Woodside, with 14,263 Parliamentary electors, and real property to the value of £309,328 in 1873. It returns one member to Parliament. The population of Aberdeen in 1396 was about 3000; in 1643, 3750; in 1708, 5556; in 1801, 26,392; in 1841, 63,262; and in 1871, 88,125; with 6718 inhabited houses, 292 uninhabited, and 77 building.

**Old Aberdeen.** **ABERDEEN, OLD,** is a small, quiet, ancient town, a burgh of barony and regality, a mile north of Aberdeen, and as far south-west of the mouth of the Don. It mostly forms one long street, 45 to 80 feet above the sea. The Don, to the north of the town, runs through a narrow, wooded, rocky ravine, and is spanned by a single Gothic arch, the “Brig o’ Balgownie” of Lord Byron. The bridge rests on gneiss, and is 67 feet wide and 34½ feet high above the surface of the river, which at ebb tide is here 20 feet deep. The bridge is the oldest in the north of Scotland, and is said to have been built about 1305. The funds belonging to the bridge amount to £24,000.

The town was formerly the see of a bishop, and had a large cathedral dedicated to St Machar. In 1137 David I. translated to Old Aberdeen the bishopric, founded at Mortlach in Banffshire in 1004 by Malcolm II. in memory of his signal victory there over the Danes. In 1153 Malcolm IV. gave the bishop a new charter.

**Cathedral.** The cathedral of St Machar, begun about 1357, occupied nearly 170 years in building, and did not remain entire fifty years. What is still left is the oldest part, viz., the nave and side aisles, 126 feet long and 62½ feet broad, now used as the parish church. It is chiefly built of *outlayer* granite stones, and while the plainest Scottish cathedral, is the only one of granite in the kingdom. On the flat pannelled ceiling of the nave are 48 heraldic shields of the princes, nobles, and bishops who aided in its erection. It has been lately repaired, and some painted windows inserted, at the cost of £4280.

The chief structure in Old Aberdeen is the stately fabric of King’s College near the middle of the town. It forms a quadrangle, with interior court 108 feet square, two sides of which have been rebuilt, and a projecting wing for a library added since 1860. The oldest parts, the Crown Tower and Chapel, date from about 1500. The former is 30 feet square and 60 feet high, and is surmounted by a structure about 40 feet high, consisting of a six-sided lantern and a royal crown, both sculptured, and resting on the intersections of two arched ornamented slips rising from the four corners of the top of the tower. The chapel, 120 feet long, 28 feet broad, and 37 feet high, still retains in the choir the original oak canopied stalls, miserere seat, and lofty open screen. These fittings are 300 years old, in the French flamboyant style, and are unsurpassed, in tasteful design and delicate execution, by the oak carving of any other old church in Europe. This carved woodwork owes its preservation to the Principal of Reformation times, who armed his people, and protected it from the fury of the barons of the Mearns after they had robbed the cathedral of its bells and lead. The chapel is still used for public worship during the University session.

Connected with Old Aberdeen is a brewery in the town, and a brick and coarse pottery work in the vicinity. There are also a Free church, two secondary schools, and two primary schools. Old Aberdeen has its own municipal officers, consisting of a provost, 4 bailies, and 13 councillors. The town is drained, lighted, supplied with water, and is within the Parliamentary boundary of New Aberdeen. There are several charitable institutions. Population in 1871, 1857; inhabited houses, 233. (A. C.)

**ABERDEENSHIRE,** a maritime county in the north-east of Scotland, between 56° 52' and 57° 42' N. lat. and between 1° 49' and 3° 48' long. W. of Greenwich. It is bounded on the north and east by the German Ocean; on the south by the counties of Kincardine, Forfar, and Perth; and on the west by those of Inverness and Banff. Its greatest length is 102 miles, and breadth 50 miles. Its circuit with sinuosities is about 300 miles, 60 being sea-coast. It is the fifth of Scotch counties in size, and is one-sixteenth of the extent of Scotland. Its area is 1970 square miles, or 1,260,625 acres, of which, in 1872, 36·6 per cent., or 685,299 acres, were cultivated, 93,339 in woods (mostly Scotch fir and larch), and 6400 in lakes. It contains 85 civil parishes and parts of 6 others, or 101 parishes, including civil and *quoad sacra*. The county is generally hilly, and mountainous in the south-west, whence, near the centre of Scotland, the Grampians send out various branches, mostly to the north-east, through the county. The run of the rivers and the general slope of the county is to the north-east and east. It is popularly divided into five districts:—First, *Mar*, mostly between the Dee and Don, and forming nearly the south half of the county. It is mountainous, especially Braemar, its west and Highland part, which contains the greatest mass of elevated land in the British Isles. Here the Dee rises amid the grandeur and wildness of lofty mountains, much visited by tourists, and composed chiefly of granite and gneiss, forming many high precipices, and showing patches of snow throughout every summer. Here rises Ben Muichdhuì, the second highest mountain in Scotland and in the British Isles, 4296 feet; Braerisch, 4225; Cairntoul, 4245; Cairngorm (famed for “Cairngorm stones,” a peculiar kind of rock crystal), 4090; Ben-a-Buid, 3860; Ben Avon, 3826; and Byron’s “dark Lochnagar,” 3786. The soil on the Dee is sandy, and on the Don loamy. The city of Aberdeen is in *Mar*. Second, *Formartin*, between the lower Don and Ythan, with a sandy coast, succeeded by a clayey, fertile, tilled tract, and then by low hills, moors, mosses, and tilled land. Third, *Buchan*, north of the Ythan, and next in size to

Mar, with parts of the coast bold and rocky, and with the interior bare, low, flat, undulating, and in parts peaty. On the coast, six miles south of Peterhead, are the Bullers of Buchan,—a basin in which the sea, entering by a natural arch, boils up violently in stormy weather. Buchan Ness is the eastmost point of Scotland. Fourth, *Garioch*, a beautiful, undulating, loamy, fertile valley, formerly called the granary of Aberdeen, with the prominent hill Benachie, 1676 feet, on the south. Fifth, *Strathbogie*, mostly consisting of hills (The Buck, 2211 feet; Noath, 1830 feet), moors, and mosses. The county as a whole, except the low grounds of Buchan, and the Highlands of Braemar, consists mainly of nearly level or undulating tracts, often naked and infertile, but interspersed with many rich and highly cultivated spots.

**Rivers.** The chief rivers are the Dee, 96 miles long; Don, 78; Ythan, 37, with mussel beds at its mouth; Ugie, 20; and Deveron, 58, partly on the boundary of Banffshire. The pearl mussel occurs in the Ythan and Don. A valuable pearl in the Scottish crown is said to be from the Ythan. Loch Muick, the largest of the few lakes in the county, 1310 feet above the sea, is only  $2\frac{1}{2}$  miles long and  $\frac{1}{2}$  to  $\frac{3}{4}$  mile broad. The rivers have plenty of salmon and trout. There are noted chalybeate springs at Peterhead, Fraserburgh, and Pananich near Ballater.

**Climate.** The climate of Aberdeenshire, except in the mountainous districts, is comparatively mild, from the sea being on two sides. The mean annual temperature at Braemar is  $43^{\circ}6$  Fahr., and at Aberdeen  $45^{\circ}8$ . The mean yearly rainfall varies from about 30 to 37 inches. The summer climate of the Upper Dee and Don valleys is the driest and most bracing in the British Isles, and grain is cultivated up to 1600 feet above the sea, or 400 to 500 feet higher than elsewhere in North Britain. All the crops cultivated in Scotland ripen, and the people often live to a great age.

**Geology.** The rocks are mostly granite, gneiss, with small tracts of syenite, mica slate, quartz rock, clay slate, grauwacke, primary-limestone, old red sandstone, serpentine, and trap. Lias, greensand, and chalk flints occur. The rocks are much covered with boulder clay, gravel, sand, and alluvium. Brick clay occurs near the coast. The surface of the granite under the boulder clay often presents glacial smoothings, grooves, and roundings. Cairngorm stone, beryl, and amethyst are found in the granite of Braemar.

**Plants and Animals.** The tops of the highest mountains have an arctic flora. At Her Majesty's Lodge, Loch Muick, 1350 feet above the sea, grow larches, vegetables, currants, laurels, roses, &c. Some ash trees, 4 or 5 feet in girth, are growing at 1300 feet above the sea. The mole occurs at 1800 feet above the sea, and the squirrel at 1400. Trees, especially Scotch fir and larch, grow well in the county, and Braemar abounds in natural timber, said to surpass any in the north of Europe. Stumps of Scotch fir and oak found in peat in the county are often far larger than any now growing. Grouse, partridges, and hares abound in the county, and rabbits are often too numerous. Red deer abound in Braemar, the deer forest being there valued at £5000 a year, and estimated at 500,000 acres, or one-fourth the area of deer forests in Scotland.

**Agriculture.** Poor, gravelly, clayey, and peaty soils prevail much more in Aberdeenshire than good rich loams, but tile draining, bones, and guano, and the best modes of modern tillage, have greatly increased the produce. Farm-houses and steadings have greatly improved, and the best agricultural implements and machines are in general use. About two-thirds of the population depend entirely on agriculture, and oatmeal in various forms, with milk, is the chief food of farm-servants. Farms are generally small, compared with those in the south-east counties. The fields are separated by dry-stone dykes, and also by wooden and wire fences.

Leases of 19 or 21 years prevail, and the five, six, or seven shift rotation is in general use. In 1872 there were 11,642 occupiers of land, with an average of 50 acres each, and paying about £536,000 in rent. Of the 585,299 acres of the county in crop in 1872, 191,880 acres were in oats, 18,930 in barley and bere, 1633 in rye, 1357 in wheat, 95,091 in turnips (being one-fifth of the turnips grown in Scotland), 8414 in potatoes, 232,178 in grasses and clover. In 1872 the county had 23,117 horses, 157,960 cattle (being above one-seventh of all the cattle in Scotland), 128,308 sheep, and 13,579 pigs. The county is unsurpassed in breeding, and unrivalled in feeding cattle, and this is more attended to than the cultivation of grain-crops. About 40,000 fat cattle are reared, and above £1,000,000 value of cattle and dead meat is sent from the county to London yearly. The capital invested in agriculture within the county is estimated at about £5,133,000.

The great mineral wealth in Aberdeenshire is its long-famed durable granite, which is largely quarried for building, paving, causewaying, and polishing. An acre of land on being reclaimed has yielded £40 to £50 worth of causewaying stones. Gneiss is also quarried, as also primary limestone, old red sandstone, conglomerate millstone, grauwacke, clay slate, syenite, and hornblende rock. Iron ore, manganese, and plumbago occur in the county.

A large fishing population in villages along the coast Fisheries engage in the white and herring fishery. Haddocks are salted and rock-dried (speldings), or smoked (finnans). The rivers and coasts yield many salmon. Peterhead was long the chief British port for the north whale and seal fishery, but Dundee now vies with it in this industry.

The manufactures and arts of the county are mainly Manufactures prosecuted in or near the town of Aberdeen, but throughout the rural districts there are much milling of corn, brick and tile making, stone-quarrying, smith-work, brewing and distilling, cart and farm implement making, casting and drying of peat, timber felling, especially on Deeside and Donside, for pit-props, railway sleepers, lath, barrel staves, &c. The chief imports into the county are, coals, lime, Trade timber, iron, slates, raw materials of textile manufactures, wheat, cattle-feeding stuffs, bones, guano, sugar, alcoholic liquors, fruits, &c. The chief exports are granite (rough, dressed, and polished), flax, woollen, and cotton goods, paper, combs, preserved provisions, oats, barley, live and dead cattle, &c. In the county there are about 520 fairs in the year for cattle, horses, sheep, hiring servants, &c.

Aberdeenshire communicates with the south by the Railways. Caledonian Railway, and five macadamised roads across the east Grampians, the highest rising 2200 feet above the sea. About 188 miles of railway (the Great North of Scotland, Formartin and Buchan, and Deeside lines), and 2359 miles of public roads, ramify through the county. Tolls over the county were abolished in 1865, and the roads are kept up by assessment. The railway lines in the county have cost on the average about £13,500 a mile. Several macadamised roads and the Great North of Scotland Railway form the main exits from the county to the north-west.

The chief antiquities in Aberdeenshire are Picts' houses Antiquities or weems; stone foundations of circular dwellings; monoliths, some being sculptured; the so-called Druid circles; stone cists; stone and earthen enclosures; the vitrified forts of Dunnideer and Noath; cairns; crannoges; earthen mounds, as the Bass; flint arrow-heads; clay funeral urns; stone celts and hammers. Remains of Roman camps occur at Peterculter, Kintore, and Auchterless, respectively 107½, 100, and 115 acres. Roman arms have been found. Ruins of ancient edifices occur. On the top of a conical hill called Dunnideer, in the Garioch district, are the remains of a



castle, supposed to be 700 years old, and surrounded by a vitrified wall, which must be still older. The foundations of two buildings still remain, the one in Braemar, and the other in the Loch of Cannor (the latter with the remains of a wooden bridge between it and the land), which are supposed to have belonged to Malcolm Canmore, King of Scotland. The most extensive ruins are the grand ones of Kildrumny Castle, evidently once a princely seat, and still covering nearly an acre of ground. It belonged to David Earl of Huntingdon in 1150, and was the seat of the Earls of Marr attainted in 1716. The Abbey of Deer, now in ruins, was begun by Cumyn Earl of Buchan about 1219.

Historical notes.

In Roman times, Aberdeenshire formed part of Vespasiana in Caledonia, and was occupied by the Taixali, a warlike tribe. The local names are mostly Gaelic. St Columba and his pupil Drostan visited Buchan in the 6th century. In 1052 Macbeth fell near the Peel Bog in Lumphannan, and a cairn which marks the spot is still shown. In 1309 Bruce defeated Comyn, Earl of Buchan, near Inverurie, and annihilated a powerful Norman family. In 1411 the Earl of Marr defeated Donald of the Isles in the battle of Harlaw, near Inverurie, when Sir Robert Davidson, Provost of Aberdeen, was killed. In 1562 occurred the battle of Corrichie on the Hill of Fare, when the Earl of Murray defeated the Marquis of Huntly. In 1715 the Earl of Marr proclaimed the Pretender in Braemar. In 1746 the Duke of Cumberland with his army marched through Aberdeenshire to Culloden. In 1817 a base line of verification, 5 miles 100 feet long, was measured in connection with the Trigonometrical Survey of the British Isles, on the Belhelvie Links 5 to 10 miles north of Aberdeen.

Eminent men.

Among eminent men connected with Aberdeenshire are, Robert Gordon of Straloch, who in 1643 published the first atlas of Scotland from actual survey; the Earls Marischal, whose chief seat was Inverurie Castle; Field-Marshal Keith, born at Inverurie Castle, 1696; Dr Thomas Reid, the metaphysician, minister of New Machar 1737 to 1752; Lord Pitsligo, attainted 1745; Sir Archibald Grant of Monymusk, who introduced turnips into the county 1756, and was the first to plant wood on a great scale; Peter Garden, Auchterless, said to have died at the age of 132, about 1780; Rev. John Skinner, author of some popular Scottish songs; Morrison the hygeist; the Earl of Aberdeen, Prime Minister during the Crimean war.

Native features.

The native Scotch population of Aberdeenshire are long-headed, shrewd, careful, canny, active, persistent, but reserved and blunt, and without demonstrative enthusiasm. They have a physiognomy distinct from the rest of the Scottish people, and have a quick, sharp, rather angry accent. The local Scotch dialect is broad, and rich in diminutives, and is noted for the use of *e* for *o* or *u*, *f* for *mh*, *d* for *th*, &c. In 1830 Gaelic was the fireside language almost every family in Braemar, but now it is little used.

Courts and Police

Aberdeenshire has a Lord-Lieutenant and 3 Vice and 60 Deputy-Lieutenants. The Supreme Court of Justiciary sits in Aberdeen twice a year to try cases from the counties of Aberdeen, Banff, and Kincardine. The counties of Aberdeen and Kincardine are under a Sheriff and two Sheriffs-Substitutes. The Sheriff Courts are held in Aberdeen and Peterhead. Sheriff Small-Debt and Circuit Courts are held at seven places in the county. There are Burgh or Bailie Courts in Aberdeen and the other royal burghs in the county. Justice of the Peace and Police Courts are held in Aberdeen, &c. The Sheriff Courts take cognisance of Commissary business. During 1871, 994 persons were confined in the Aberdeenshire prisons. In the year 1870-71, 74 parishes in the county were assessed £53,703 for 7702 poor on the roll and 1847 casual poor.

Churches.

Aberdeenshire contains 105 Established churches, 99 Free, 31 Episcopal, 15 United Presbyterian, 9 Roman

Catholic, and 31 of other denominations. This includes detached parts of the two adjacent counties.

By the census of 1871, 84·83 per cent. of the children in the county, of the ages 5 to 13, were receiving education. Those formerly called the parochial schoolmasters of Aberdeenshire participate in the Dick and Milne Bequests, which contributed more salary to the schoolmasters in some cases than did the heritors. Most of the schoolmasters are Masters of Arts, and many are preachers. Of 114 parochial schools in the county before the operation of the new Education Act, 89 received the Milne Bequest of £20 a year, and 91 the Dick Bequest, averaging £30 a year, and a schoolmaster with both bequests would have a yearly income of £145 to £150, and in a few cases £250. The higher branches of education have been more taught in the schools of the shires of Aberdeen and Banff than in the other Scotch counties, and pupils have been long in the habit of going direct from the schools of these two counties to the University.

The value of property, or real rental of the lands and heritages in the county (including the burghs, except that of Aberdeen), for the year 1872-73, was £769,191. The railway and the water works in the city and county were for the same year valued at £11,133. For general county purposes for the year ending 15th May 1872, there was assessed £14,803 to maintain police, prisons, militia, county and municipal buildings, &c., and £19,320 to maintain 2359 miles of public county roads.

The chief seats on the proprietary estates are—Balmoral Castle, the Queen; Mar Lodge and Skene House, Earl of Fife; Aboyne Castle, Marquis of Huntly; Duncht House, Earl of Crawford and Balcarres; Keith Hall, Earl of Kintore; Slains Castle, Earl of Errol; Haddo House, Earl of Aberdeen; Castle Forbes, Lord Forbes; Philorth House, Lord Saltoun; Huntly Lodge, the Duke of Richmond. Other noted seats are—Drum, Irvine; Invercauld, Farquharson; Newe Castle, Forbes; Castle Fraser, Fraser; Cluny Castle, Gordon; Meldrum House, Urquhart; Craigston Castle, Urquhart; Pitfour, Ferguson; Ellon Castle, Gordon; Fyvie Castle, Gordon. Ten baronets and knights have residences in the county. Of the proprietors many live permanently on their estates. Their prevailing names are Gordon, Forbes, Grant, Fraser, Duff, and Farquharson.

Aberdeenshire has one city, Aberdeen, a royal parliamentary burgh; three other royal parliamentary burghs, Inverurie, Kintore, and Peterhead; and seven burghs of barony, Old Aberdeen, Charleston of Aboyne, Fraserburgh, Huntly, Old Meldrum, Rosehearty, and Turriff.

The county sends two members to Parliament—one for East Aberdeenshire, with 4341 electors, and the other for West Aberdeenshire, with 3942 electors. The county has also four parliamentary burghs, which, with their respective populations in 1871, are—Aberdeen, 88,125; Peterhead, 8535; Inverurie, 2856; and Kintore, 659. The first sends one member to Parliament, and the other three unite with Elgin, Cullen, and Banff, in sending another.

By the census 1801 the county had 121,065 inhabitants, and by that of 1871, 244,603, with 53,576 families, 111 females to 100 males, 34,589 inhabited houses, 1052 uninhabited houses, and 256 building. In 1871 there were in eight towns (Aberdeen, Peterhead, Fraserburgh, Huntly, Inverurie, Old Meldrum, Turriff, and New Pitsligo), 111,978 inhabitants; in 32 villages, 19,561; and in rural districts, 113,064.

(*New Statistical Account of Scotland*, vol. xii.; the charters of the burgh; extracts from the Council Register down to 1625, and selections from the letters, guildry, and treasurer's accounts, forming 3 volumes of the Spalding Club; *Collections for a History of the Shires of A. and Banff*, edited by Joseph Robertson, Esq., 4to, Spalding Club;

Population.

*Registrum Episcopatus Aberdonensis*, vols. i. and ii., by Prof. Cosmo Innes, 4to, Spalding Club; *The History of A.*, by Walter Thom, 2 vols. 12mo, 1811; *Buchan*, by the Rev. John B. Pratt, 12mo, 1859; *Historical Account and Delineation of A.*, by Robert Wilson, 1822; *First Report of Royal Com. on Hist. MSS.*, 1869; *The Annals of A.*, by William Kennedy, 1818; Orem's *Description of the Chanonry, Cathedral, and King's College of Old A.*, 1724–25, 1830; *The Castellated Architecture of A.*, by Sir Andrew Leith Hay of Rannes, imp. 4to; *Specimens of Old Castellated Houses of A.*, with drawings by Giles, folio, 1838; *Lives of Eminent Men of A.*, by James Bruce, 12mo, 1841). (A. C.)

ABERDEEN, GEORGE HAMILTON GORDON, FOURTH EARL OF, was born at Edinburgh on the 28th January 1784. He was educated at Harrow School, and at St John's College, Cambridge, where he graduated in 1804. He succeeded his grandfather in the earldom in 1801, and in the same year he made an extended tour through Europe, visiting France, Italy, and Greece. On his return he founded the Athenian Club, the membership of which was confined to those who had travelled in Greece. This explains Lord Byron's reference in the *English Bards and Scotch Reviewers* to "the travelled Thane, Athenian Aberdeen." Soon after his return he contributed a very able article to the *Edinburgh Review* (vol. vi.), on Gell's *Topography of Troy*. Another literary result of his tour was the publication in 1822 of *An Inquiry into the Principles of Beauty in Grecian Architecture*, the substance of which had appeared some years before in the form of an introduction to a translation of Vitruvius' *Civil Architecture*. In 1806, having been elected one of the representative peers for Scotland, he took his seat in the House of Lords on the Tory side. He was already on terms of intimacy with the leading members of the then predominant party, and in particular with Pitt, through the influence of his relative, the celebrated Duchess of Gordon. In 1813 he was intrusted with a delicate and difficult special mission to Vienna, the object being to induce the Emperor of Austria to join the alliance against his son-in-law Napoleon. His diplomacy was completely successful; the desired alliance was secured by the treaty of Töplitz, which the Earl signed as representative of Great Britain in September 1813. On his return at the conclusion of the war, he was raised to a British peerage, with the title of Viscount Gordon. Lord Aberdeen was a member of the Cabinet formed by the Duke of Wellington in 1828, for a short time as Chancellor of the Duchy of Lancaster, and then as Foreign Secretary. He was Colonial Secretary in the Tory Cabinet of 1834–5, and again received the seals of the Foreign Office under Sir Robert Peel's administration of 1841. The policy of non-intervention, to which he steadfastly adhered in his conduct of foreign affairs, was at once his strength and his weakness. According to the popular idea, he failed to see the limitations and exceptions to a line of policy which nearly all admitted to be as a general rule both wise and just. On the whole, his administration was perhaps more esteemed abroad than at home. It has been questioned whether any English minister ever was on terms of greater intimacy with foreign courts, but there is no substantial warrant for the charge of want of patriotism which was sometimes brought against him. On the two chief questions of home politics which were finally settled during his tenure of office, he was in advance of most of his party. While the other members of the Government yielded Catholic Emancipation and the repeal of the Corn Laws as unavoidable concessions, Lord Aberdeen spoke and voted for both measures from conviction of their justice. On the 13th June 1843, he moved the second reading of his bill "to remove doubts respecting the

admission of ministers to benefices in Scotland," and it was passed into law in that session, though a similar measure had been rejected in 1840. As the first proposal did not prevent, so the passing of the Act had no effect in healing the breach in the Established Church of Scotland which occurred in 1845. On the defeat of Lord Derby's government in 1852, the state of parties was such as to necessitate a coalition government, of which Lord Aberdeen, in consequence of the moderation of his views, was the natural chief. He had been regarded as the leader of the Peel party from the time of Sir Robert's death, but his views on the two great questions of home policy above mentioned rendered him more acceptable to the Liberals, and a more suitable leader of a coalition government than any other member of that party could have been. His administration will chiefly be remembered in connection with the Crimean war, which, it is now generally believed, might have been altogether prevented by a more vigorous policy. The incompetence of various departments at home, and the gross mismanagement of the commissariat in the terrible winter of 1854, caused a growing dissatisfaction with the government, which at length found emphatic expression in the House of Commons, when a motion submitted by Mr Roebuck, calling for inquiry, was carried by an overwhelming majority. Lord Aberdeen regarded the vote as one of no-confidence, and at once resigned. From this period Lord Aberdeen took little part in public business. In recognition of his services he received, soon after his resignation, the decoration of the Order of the Garter. He died December 13, 1860. Lord Aberdeen was twice married,—first in 1805, to a daughter of the first Marquis of Abercorn, who died in 1812, and then to the widow of Viscount Hamilton. He was succeeded in the title and estates by Lord Haddo, his son by the second marriage.

ABERDOUR, a village in the county of Fife, in Scotland, pleasantly situated on the north shore of the Firth of Forth, and much resorted to for sea-bathing. It is 10 miles N.W. of Edinburgh, with which there is a frequent communication by steamer.

ABERFELDY, a village in Perthshire, celebrated in Scottish song for its "birks" and for the neighbouring falls of Moness. It is the terminus of a branch of the Highland Railway.

ABERGAVENNY, a market town in Monmouthshire, 14 miles west of Monmouth, situated at the junction of a small stream called the Gavenny, with the river Usk. It is supposed to have been the *Gobannium* of the Romans, so named from *Gobannio*, the Gavenny. The town was formerly walled, and has the remains of a castle built soon after the Conquest, and also of a Benedictine monastery. The river Usk is here spanned by a noble stone bridge of fifteen arches. Two markets are held weekly, and elegant market buildings have recently been erected. There is a free grammar school, with a fellowship and exhibitions at Jesus College, Oxford. No extensive manufacture is carried on except that of shoes; the town owes its prosperity mainly to the large coal and iron works in the neighbourhood. Abergavenny is a polling place for the county. Population of parish (1871), 6318.

ABERNETHY, a town in Perthshire, situated in the parish of the same name, on the right bank of the Tay, 7 miles below Perth. The earliest of the Culdee houses was founded there, and it is said to have been the capital of the Pictish kings. It was long the chief seat of the Episcopacy in the country, till, in the 9th century, the bishopric was transferred to St Andrews. There still remains at Abernethy a curious circular tower, 74 feet high and 48 feet in circumference, consisting of sixty-four courses of hewn stone. A number of similar towers, though not so well



built, are to be met with in Ireland, but there is only one other in Scotland, viz., that at Brechin. Petrie argues, in his *Round Towers of Ireland*, that these structures have been used as belfries, and also as keeps.

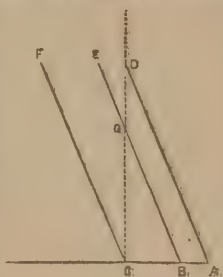
ABERNETHY, JOHN,—a Protestant dissenting divine of Ireland, was born at Coleraine, county Londonderry, Ulster, where his father was minister (Nonconformist), on the 19th October 1680. In his thirteenth year he entered a student at the University of Glasgow. On concluding his course at Glasgow he went to Edinburgh University, where his many brilliant gifts and quick and ready wit—thought-born, not verbal merely—struck the most eminent of his contemporaries and even his professors. Returning home, he received licence to preach from his Presbytery before he was twenty-one. In 1701 he was urgently invited to accept the ministerial charge of an important congregation in Antrim; and after an interval of two years, he was ordained there on 8th August 1703. His admiring biographer tells of an amount and kind of work done there, such as only a man of fecund brain, of large heart, of healthful frame, and of resolute will, could have achieved. In 1717 he was invited to the congregation of Usher's Quay, Dublin, as colleague with Rev. Mr Arbuckle, and contemporaneously, to what was called the Old Congregation of Belfast. The Synod assigned him to Dublin. He refused to accede, and remained at Antrim. This refusal was regarded then as ecclesiastical high-treason; and a controversy of the most intense and disproportionate character followed. The controversy and quarrel bears the name of the two camps in the conflict, the "Subscribers" and the "Non-subscribers." Out-and-out evangelical as John Abernethy was, there can be no question that he and his associates sowed the seeds of that after-struggle in which, under the leadership of Dr Henry Cooke, the Arian and Socinian elements of the Irish Presbyterian Church were thrown out. Much of what he contended for, and which the "Subscribers" opposed bitterly, has been silently granted in the lapse of time. In 1726 the "Non-subscribers," spite of an almost woefully pathetic pleading against separation by Abernethy, were cut off, with due ban and solemnity, from the Irish Presbyterian Church. In 1730, spite of being a "Non-subscriber," he was called by his early friends of Wood Street, Dublin, whither he removed. In 1731 came on the greatest controversy in which Abernethy engaged, viz., in relation to the Test Act nominally, but practically on the entire question of tests and disabilities. His stand was "against all laws that, upon account of mere differences of religious opinions and forms of worship, excluded men of integrity and ability from serving their country." He was nearly a century in advance of his century. He had to reason with those who denied that a Roman Catholic or Dissenter could be a "man of integrity and ability." His *Tracts*—afterwards collected—did fresh service, generations later. And so John Abernethy through life was ever foremost where unpopular truth and right were to be maintained; not did he, for sake of an ignoble expediency, spare to smite the highest-seated wrongdoers any more than the hoariest errors (as he believed). He died in 1740, having been twice married. (Kippis' *Biog. Brit.*, s. v.; Dr Duchal's *Life*, prefixed to *Sermons; Diary in MS.*, 6 vols. 4to; *History of Irish Presbyterian Church*.) (A. B. C.)

ABERNETHY, JOHN, grandson of the preceding, an eminent surgeon, was born in London on the 3d of April 1764. His father was a London merchant. Educated at Wolverhampton Grammar School, he was apprenticed in 1779 to Sir Charles Blicke, a surgeon in extensive practice in the metropolis. He attended Sir William Blizard's anatomical lectures at the London Hospital, and was early employed to assist Sir William "de-

monstrator," he also attended Pott's surgical lectures at St Bartholomew's Hospital, as well as the lectures of the celebrated John Hunter. On Pott's resignation of the office of surgeon of St Bartholomew's, Sir Charles Blicke, who was assistant-surgeon, succeeded him, and Abernethy was elected assistant-surgeon in 1787. In this capacity he began to give lectures in Bartholomew Close, which were so well attended that the governors of the hospital built a regular theatre (1790-91), and Abernethy thus became the founder of the distinguished School of St Bartholomew's. He held the office of assistant-surgeon of the hospital for the long period of twenty-eight years, till, in 1815, he was elected principal surgeon. He had before that time been appointed surgeon of Christ's Hospital (1813), and Professor of Anatomy and Surgery to the Royal College of Surgeons (1814). Abernethy had great fame both as a practitioner and as a lecturer, his reputation in both respects resting on the efforts he made to promote the practical improvement of surgery. His *Surgical Observations on the Constitutional Origin and Treatment of Local Diseases* (1809)—known as "My Book," from the great frequency with which he referred his patients to it, and to page 72 of it in particular, under that name—was one of the earliest popular works on medical science. The views he expounds in it are based on physiological considerations, and are the more important that the connection of surgery with physiology had scarcely been recognised before the time he wrote. The leading principles on which he insists in "My Book" are chiefly these two:—1st, That topical diseases are often mere symptoms of constitutional maladies, and then can only be removed by general remedies; and 2d, That the disordered state of the constitution very often originates in, or is closely allied to deranged states of the stomach and bowels, and can only be remedied by means that beneficially affect the functions of those organs. His profession owed him much for his able advocacy of the extension in this way of the province of surgery. He had great success as a teacher from the thorough knowledge he had of his science, and the persuasiveness with which he enunciated his views. It has been said, however, that the influence he exerted on those who attended his lectures was not beneficial in this respect, that his opinions were delivered so dogmatically, and all who differed from him were disparaged and denounced so contemptuously, as to repress instead of stimulating inquiry. It ought to be mentioned, that he was the first to suggest and to perform the daring operation of securing by ligature the carotid and the external iliac arteries. The celebrity Abernethy attained in his practice was due not only to his great professional skill, but also in part to the singularity of his manners. He used great plainness of speech in his intercourse with his patients, treating them often brusquely, and sometimes even rudely. In the circle of his family and friends he was courteous and affectionate; and in all his dealings he was strictly just and honourable. He resigned his surgery at St Bartholomew's Hospital in 1827, and his professorship at the College of Surgeons two years later, on account of failing health, and died at his residence at Enfield on the 20th of April 1831. A collected edition of his works in five volumes was published in 1830. A biography, *Memoirs of John Abernethy*, by George Maclellain, F.R.C.S., appeared in 1853, and though anything but satisfactory, passed through several editions.

ABERRATION, or (more correctly) THE ABERRATION OF LIGHT, is a remarkable phenomenon, by which stars appear to deviate a little, in the course of a year, from their true places in the heavens. It results from the eye of the observer being carried onwards by the motion of the earth on its orbit, during the time that light takes to

travel from the star to the earth. The effect of this combination of motions may be best explained by a familiar illustration. Suppose a rain-drop falling vertically is received in a tube that has a lateral motion. In order that the drop may fall freely down the axis of the tube, the latter must be inclined at such an angle as to move from the position AD to BE, and again to CE, in the times the drop moves from D to G, and from G to C. The drop in this case, since it moves down the axis all the way, must strike the bottom of the tube at C in the direction FC. The light proceeding from a star is not seen in its true direction, but strikes the eye obliquely, for a precisely similar reason. If lines be taken to represent the motions, so that the eye is carried from A to C during the time that light moves from D to C, the light will appear to the eye at C to come, not from D, but from F. The angle DCF, contained by the true and apparent directions of the star, is the *aberration*. It is greatest when the two motions are at right angles to each other, *i.e.*, when the star's longitude is  $90^\circ$  in advance of, or behind, the heliocentric longitude of the earth, or (which amounts to the same thing)  $90^\circ$  behind, or in advance of, the geocentric longitude of the sun. (See ASTRONOMY.) Now, in the right-angled triangle



ACD,  $\tan ADC$  (*i.e.*,  $\angle DCF$ ) =  $\frac{AC}{DC}$ ; whence it appears that the tangent of the angle of aberration (or, since the angle is very small, the aberration itself) is equal to the ratio, velocity of earth in orbit

velocity of light. The rate of the earth's motion

being to the velocity of light in the proportion of 1 to 10,000 nearly, the maximum aberration is small, amounting to about 20.4 seconds of arc,—a quantity, however, which is very appreciable in astronomical observations.

Aberration always takes place in the direction of the earth's motion; that is, it causes the stars to appear nearer than they really are to the point towards which the earth is at the moment moving. That point is necessarily on the ecliptic, and  $90^\circ$  in advance of the earth in longitude. The effect is to make a star at the pole of the ecliptic appear to move in a plane parallel to the ecliptic, so as to form a small ellipse, similar to the earth's orbit, but having its major axis parallel to the minor axis of that orbit, and *vice versa*. As we proceed from the pole, the apparent orbits the stars describe become more and more elliptical, till in the plane of the ecliptic the apparent motion is in a straight line. The length of this line, as well as of the major axes of the different ellipses, amounts, in angular measure, to about  $40''.8$ . The stars thus appear to oscillate, in the course of the year,  $20''.4$  on each side of their true position, in a direction parallel to the plane of the ecliptic, and the quantity  $20''.4$  is therefore called the *constant of aberration*.

For the discovery of the aberration of light, one of the finest in modern astronomy, we are indebted to the distinguished astronomer Dr Bradley. He was led to it, in 1727, by the result of observations he made with the view of determining the annual parallax of some of the stars; that is, the angle subtended at these stars by the diameter of the earth's orbit. He observed certain changes in the positions of the stars that he could not account for. The deviations were not in the direction of the apparent motion that parallax would give rise to, and he had no better

success in attempting to explain the phenomenon by the nutation of the earth's axis, radiation, errors of observation, &c. At last the true solution of the difficulty occurred to him, suggested, it is said, by the movements of a vane on the top of a boat's mast. Roemer had discovered, a quarter of a century before, that light has a velocity which admits of measurement; and Bradley perceived that the earth's motion, having a perceptible relation to that of light, must affect the direction of the visual rays, and with this the apparent positions of the stars. He calculated the aberration from the known relative velocities of the earth and of light, and the results agreed entirely with his observations.

The observed effects of aberration are of importance as supplying an independent method of measuring the velocity of light, but more particularly as presenting one of the few direct proofs that can be given of the earth's motion round the sun. It is indeed the most satisfactory proof of this that astronomy furnishes, the phenomenon being quite inexplicable on any other hypothesis.

**ABERYSTWITHE**, a municipal and parliamentary borough, market town, and seaport of Wales, in the county of Cardigan, is situated at the western end of the Vale of Rheidol, near the confluence of the rivers Ystwith and Rheidol, and about the centre of Cardigan Bay. It is the terminal station of the Cambrian Railway, and a line to the south affords direct communication with South Wales, Bristol, &c. The borough unites with Cardigan, Lampeter, &c., in electing a member of Parliament. Coal, timber, and lime are imported, and the exports are lead, oak bark, flannel, and corn. The harbour has of late been much improved; and the pier, completed in 1865, forms an excellent promenade. There are several elegant buildings, and it has been proposed to establish here a University College of Wales. On a promontory to the S.W. of the town are the ruins of its ancient castle, erected in 1277, by Edward I., on the site of a fortress of great strength, built by Gilbert de Strongbow, and destroyed by Owen Gwynedd. From its picturesque situation and healthy climate, and the suitableness of the beach for bathing, Aberystwith has risen into great repute as a watering-place, and attracts many visitors. Much of the finest scenery in Wales, such as the Devil's Bridge, &c., lies within easy reach. Population (1871), 6898.

**ABETTOR**, a law term implying one who instigates, encourages, or assists another to perform some criminal action. See ACCESSORY.

**ABEYANCE**, a law term denoting the expectancy of an estate. Thus, if lands be leased to one person for life, with reversion to another for years, the remainder for years is in abeyance till the death of the lessee.

**ABGAR**, the name or title of a line of Kings of Edessa in Mesopotamia. One of them is known from a correspondence he is said to have had with Jesus Christ. The letter of Abgar, entreating Jesus to visit him and heal him of a disease, and offering him an asylum from the wrath of the Jews, and the answer of Jesus promising to send a disciple to heal Abgar after His ascension, are given by Eusebius, who believed the documents to be genuine. The same belief has been held by a few moderns, but there can be no doubt whatever that the letter of Jesus at least is apocryphal. It has also been alleged that Abgar possessed a picture of Jesus, which the credulous may see either at Rome or at Genoa. Some make him the possessor of the handkerchief a woman gave Jesus; as he bore the cross, to wipe the sweat from His face with, on which, it is fabled, His features remained miraculously imprinted.

**ABTAD, BAKEREE**, a name given to the western branch of the Nile, above Khartoum. It is better known as the White Nile. See NILE.



ABIES. See Fir.

ABILA, a city of ancient Syria, the capital of the tetrarchy of Abilene, a territory whose limits and extent it is impossible now to define. The site of Abila is indicated by some ruins and inscriptions on the banks of the river Barada, between Baalbet and Damascus, about twelve miles from the latter city. Though the names Abel and Abila differ in derivation and in meaning, their similarity has given rise to the tradition that this was the scene of Abel's death.

ABILDGAARD, NIKOLAJ, called "the Father of Danish Painting," was born in 1744. He formed his style on that of Claude and of Nicolas Poussin, and was a cold theorist, inspired not by nature but by art. As a technical painter he attained remarkable success, his tone being very harmonious and even, but the effect, to a foreigner's eye, is rarely interesting. His works are scarcely known out of Copenhagen, where he won an immense fame in his own generation, and where he died in 1809. He was the founder of the Danish school of painting, and the master of Thorwaldsen and Eckersberg.

ABIMELECH (אֲבִימֶלֶךְ, *father of the king*, or rather perhaps *king-father*), occurs first in the Bible as the name of certain kings of the Philistines at Gerar (Gen. xx. 2, xxi. 22, xxvi. 1). From the fact that the name is applied in the inscription of the thirty-fourth psalm to Achish, it has been inferred with considerable probability that it was used as the official designation of the Philistinian kings. The name was also borne by a son of Gideon, judge of Israel, by his Shechemite concubine (Judges viii. 31). On the death of Gideon, who had refused the title of king both for himself and his children, Abimelech set himself to obtain the sovereignty through the influence of his mother's relatives. In pursuance of his plan he slew seventy of his brethren "upon one stone" at Ophrah, Jotham, the youngest of them, alone contriving to escape. This is one of the earliest recorded instances of a practice exceedingly common on the accession of Oriental despots. Abimelech was eventually made king, although his election was opposed by Jotham, who boldly appeared on Mount Gerizim and told the assembled Shechemites the fable of the trees desiring a king. At the end of the third year of his reign the Shechemites revolted, and under the leadership of Gaal made an unsuccessful attempt to throw off the authority of Abimelech. In Judges ix. there is an account of this insurrection, which is specially interesting owing to the full details it gives of the nature of the military operations. After totally destroying Shechem, Abimelech proceeded against Thebez, which had also revolted. Here, while storming the citadel, he was struck on the head by the fragment of a millstone thrown from the wall by a woman. To avoid the disgrace of perishing by a woman's hand, he requested his armour-bearer to run him through the body. Though the immediate cause of his death was thus a sword-thrust, his memory was not saved from the ignominy he dreaded (2 Sam. xi. 21). It has been usual to regard Abimelech's reign as the first attempt to establish a monarchy in Israel. The facts, however, seem rather to support the theory of Ewald (*Gesch. ii. 444*), that Shechem had asserted its independence of Israel, when it chose Abimelech as its king.

ABINGDON, a parliamentary and municipal borough and market town of England, in Berkshire, on a branch of the Thames, 7 miles south of Oxford, and 51 miles W.N.W. of London. It is a place of great antiquity, and was an important town in the time of the Heptarchy. Its name is derived from an ancient abbey. The streets, which are well paved, converge to a spacious area, in which the market is held. In the centre of this area stands the market-house, supported on lofty pillars, with a large hall

above, appropriated to the summer assizes for the county, and the transaction of other public business. The town contains two churches, which are said to have been erected by the abbots of Abingdon, one dedicated to St Nicholas and the other to St Helena; several charitable institutions, and a free grammar school, with scholarships at Pembroke College, Oxford. In 1864 a memorial of Prince Albert was erected at Abingdon, a richly ornamented structure, surmounted by a statue of the Prince. Abingdon was incorporated by Queen Mary. It sends one member to Parliament, and is governed by a mayor, four aldermen, and twelve councillors. In the beginning of the century it manufactured much sail-cloth and sacking; but its chief trade now is in corn and malt, carpets, and coarse linen. It is a station on a branch of the Great Western Railway. Population (1871), 6571.

ABIOTENESIS, as a name for the production of living by not-living matter, has of late been superseding the less accurate phrase "Spontaneous Generation." Professor Huxley, who made use of the word in his presidential address to the British Association in 1870, distinguished Abiogenesis from "Xenogenesis" or "Heterogenesis," which occurs, or is supposed to occur, not when dead matter produces living matter, but when a living parent gives rise to offspring which passes through a totally different series of stages from those exhibited by the parent, and does not return into the parent's cycle of changes. When a "living parent gives rise to offspring which passes through the same cycle of changes as itself," there occurs "Homogenesis." "Biogenesis" includes both of these. Other names for Abiogenesis are *Generatio Equivoca*, *Generatio Primaria*, *Archigenesis* (*Urzeugung*), *Archebiosis*, &c. The question of Abiogenesis—whether under certain conditions living matter is produced by not-living matter—as it is one of the most fundamental, is perhaps also the oldest in Biology; but within recent years—partly because the means of accurate experimentation have been increased and the microscope improved, and partly because the question has been recognised in its important bearings on evolution, the correlation of forces, and the theory of infectious diseases—naturalists have been led to bestow more attention upon it than at any previous period. While, therefore, the doctrine of Abiogenesis cannot be said to be either finally established or refuted, it is at least reasonable to believe that we are gradually advancing to a solution. Among the older observers of phenomena bearing on the question may be named Aristotle, who, with the ancients generally, favoured Abiogenesis; Redi, the founder of the opposite view; Vallisneri; Buffon; Needham; and Spallanzani; among later observers, Schwann and Schulze, Schroeder and Dusch, Pasteur, Pouchet, Haeckel, Huxley, Bastian, and many others. The experiments and observations made by these naturalists, and their results—the ingenious expedients employed to prevent inaccuracy—the interesting and often marvellous transformations which microscopists declare they have witnessed—will be discussed in the article HISTOLOGY; here it will be enough to note the general nature of the reasonings with which the opponents and defenders of Abiogenesis support their views. The opponents maintain that all trustworthy observations have hitherto shown living matter to have sprung from pre-existing living matter; and that the further we search and examine, the smaller becomes the number of those organisms which we cannot demonstrate to have arisen from living parents. They hold that seeming instances of spontaneous generation are usually to be explained by the germ-theory—the presence of invisible germs in the air; and they call to their aid such authorities as Pasteur and Tyndall. The defenders of Abiogenesis, on the other

hand, while interpreting the results of past observation and experiment in their own favour, are yet less disposed to rest on these, rather preferring to argue from those wide analogies of evolution and correlation which seem to support their doctrine. Thus Haeckel expressly embraces Abiogenesis as a necessary and integral part of the theory of universal evolution; and Huxley, in the same spirit, though from the opposite camp, confesses that if it were given him to look beyond the abyss of geologically recorded time to the still more remote period when the earth was passing through physical and chemical conditions, he should expect to be a witness of the evolution of living protoplasm from not-living matter. (*Critiques and Addresses*, p. 239.) From this point of view, of course, any microscopic observations that have been made seem very limited and comparatively unimportant. The Abiogenists, indeed, are not without arguments to oppose the results of past observation that seem unfavourable to their views; they argue that, as yet, all the forms observed and shown to be produced by Biogenesis are forms possessing a certain degree of organisation, which in their case makes Abiogenesis unlikely, from the first; whereas it has not been shown that the simplest structures—the *Monera*—do not arise by Abiogenesis. But it is not so much on grounds of fact and experiment the defenders of the Abiogenesis theory are convinced of its truth, as because it seems to gain confirmation from reasonings of much wider scope; because Abiogenesis aids the theory of evolution by tracing the organic into the inorganic; because it fosters the increasing unpopularity of the hypothesis of a special "vital force;" and because, if this theory of the "perpetual origination of low forms of life, now, as in all past epochs," were established, it would agree well with the principle of uniformity, and by disclosing the existence of unknown worlds of material for development, would relieve natural selection with its assisting causes from what many consider the too Herculean labour of evolving all species from one or a very few primary forms. The fullest discussion of the subject of Abiogenesis, from the Abiogenist's point of view, is to be found in Dr Bastian's *Beginnings of Life*. Professor Huxley's address, already referred to, contains an interesting historical survey, as well as a masterly summary of facts and arguments in favour of Biogenesis. For many interesting experiments, see *Nature*, 1870-73.

**ABIPONES**, a tribe of South American Indians, inhabiting the territory lying between Santa Fé and St Iago. They originally occupied the Chaco district of Paraguay, but were driven thence by the hostility of the Spaniards. According to M. Dobrizhoffer, who, towards the end of last century, lived among them for a period of seven years, they have many singular customs and characteristics. They seldom marry before the age of thirty, are chaste and otherwise virtuous in their lives, though they practise infanticide, and are without the idea of God. "With the Abipones," says Darwin, "when a man chooses a wife, he bargains with the parents about the price. But it frequently happens that the girl rescinds what has been agreed upon between the parents and bridegroom, obstinately rejecting the very mention of marriage. She often runs away and hides herself, and thus eludes the bridegroom." The Abiponian women suckle those infants that are spared for the space of two years,—an onerous habit, which is believed to have led to infanticide as a means of escape. The men are brave in war, and pre-eminently expert in swimming and horsemanship. Numerically the tribe is insignificant. M. Dobrizhoffer's account of the Abiponians was translated into English by Sara Coleridge, at the suggestion of Mr Southey, in 1822.

**ABJURATION**. See ALLEGIANCE, OATH OF.

**ABKHASIA**, or **ABASIA**, a tract of Asiatic Russia, on the border of the Black Sea, comprehending between lat. 42° 30' and 44° 45' N. and between long. 37° 3' and 40° 36' E. The high mountains of the Caucasus on the N. and N.E. divide it from Circassia; on the S.E. it is bounded by Mingrelia; and on the S.W. by the Black Sea. Though the country is generally mountainous, there are some deep well-watered valleys, and the climate is mild. The soil is fertile, producing grain, grapes, and other fruits. Some of the inhabitants devote themselves to agriculture, some to the rearing of cattle and horses, and not a few support themselves by piracy and robbery. Honey is largely produced, and is exported to Turkey; and excellent arms are made. Both in ancient and in modern times there has been considerable traffic in slaves. This country was early known to the ancients, and was subdued by the Emperor Justinian, who introduced civilisation and Christianity. Afterwards the Persians, then the Georgians, and more recently the Turks, ruled over the land. Under the Turks Christianity gradually disappeared, and Mohammedanism was introduced in its stead. By the treaties of Akerman and Adrianople, Russia obtained possession of the fortresses of this territory; but till the insurrection of 1866, the chiefs had almost unlimited power. The principal town is Sukumkaleh. The population of Abkhasia is variously stated at from 50,000 to 250,000. See Palgrave's *Essays on Eastern Questions*, 1872.

**ABLUTION**, a ceremonial purification, practised in nearly every age and nation. It consisted in washing the body in whole or part, so as to cleanse it symbolically from defilement, and to prepare it for religious observances. Among the Jews we find no trace of the ceremony in patriarchal times, but it was repeatedly enjoined and strictly enforced under the Mosaic economy. It denoted either—(1.) Cleansing from the taint of an inferior and less pure condition, and initiation into a higher and purer state, as in the case of Aaron and his sons on their being set apart to the priesthood; or (2.) Cleansing from the soil of common life, in preparation for special acts of worship, as in the case of the priests who were commanded, upon pain of death, to wash their hands and feet before approaching the altar; or (3.) Cleansing from the pollution occasioned by particular acts and circumstances, as in the case of the eleven species of uncleanness mentioned in the Mosaic law; or (4.) The absolving or purifying one's self from the guilt of some particular criminal act, as in the case of Pilate at the trial of the Saviour. The sanitary reasons which, in a warm climate and with a dry sandy soil, rendered frequent abluion an imperative necessity, must not be allowed to empty the act of its symbolic meaning. In the Hebrew different words are used for the washing of the hands before meals, which was done for the sake of cleanliness and comfort, and for the washing or plunging enjoined by the ceremonial law. At the same time it is impossible to doubt that the considerations which made the law so suitable in a physical point of view were present to the mind of the Lawgiver when the rite was enjoined. Traces of the practice are to be found in the history of nearly every nation. The customs of the Mohammedans, in this as in other matters, are closely analogous to those of the Jews. With them abluion must in every case precede the exercise of prayer, and their law provides that in the desert, where water is not to be found, the Arabs may perform the rite with sand. Various forms of abluion practised by different nations are mentioned in the sixth book of the *Æneid*, and we are told that *Æneas* washed his ensanguined hands after the battle before touching his *Penates*. Symbolic abluion finds a place under the New Testament dispensation in the rite of baptism, which is observed, though with some variety of form and circum-



stances, throughout the whole Christian Church. By Roman Catholics and Ritualists, the term ablution is applied to the cleansing of the chalice and the fingers of the celebrating priest after the administration of the Lord's Supper.

**ABNER** (אֲבִנֵּר, *father of light*), first cousin of Saul (1 Sam. xiv. 50) and commander-in-chief of his army. The chief references to him during the lifetime of Saul are found in 1 Sam. xvii. 55, and xxvi. 5. It was only after that monarch's death, however, that Abner was brought into a position of the first political importance. David, who had some time before been designated to the throne, was accepted as king by Judah alone, and was crowned at Hebron. The other tribes were actuated by a feeling hostile to Judah, and, as soon as they had thrown off the Philistinan yoke, were induced by Abner to recognise Ishbosheth, the surviving son of Saul, as their king. One engagement between the rival factions under Joab and Abner respectively (2 Sam. ii. 12) is noteworthy, inasmuch as it was preceded by an encounter between twelve chosen men from each side, in which the whole twenty-four seem to have perished. In the general engagement which followed, Abner was defeated and put to flight. He was closely pursued by Asahel, brother of Joab, who is said to have been "light of foot as a wild roe." As Asahel would not desist from the pursuit, though warned, Abner was compelled to slay him in self-defence. This originated a deadly feud between the leaders of the opposite parties, for Joab, as next of kin to Asahel, was by the law and custom of the country the avenger of his blood. For some time afterwards the war was carried on, the advantage being invariably on the side of David. At length Ishbosheth lost the main prop of his tottering cause by remonstrating with Abner for marrying Rizpah, one of Saul's concubines, an alliance which, according to Oriental notions, implied pretensions to the throne. Abner was indignant at the rebuke, and immediately transferred his allegiance to David, who not only welcomed him, but promised to give him the command of the combined armies on the re-union of the kingdoms. Almost immediately after, however, Abner was slain by Joab and his brother Abishai at the gate of Hebron. The ostensible motive for the assassination was a desire to avenge Asahel, and this would be a sufficient justification for the deed according to the moral standard of the time. There can be little doubt, however, that Joab was actuated in great part by jealousy of a new and formidable rival, who seemed not unlikely to usurp his place in the king's favour. The conduct of David after the event was such as to show that he had no complicity in the act, though he could not venture to punish its perpetrators. The dirge which he repeated over the grave of Abner (2 Sam. iii. 33-4) has been thus translated:—

Should Abner die as a villain dies?—  
Thy hands—not bound,  
Thy feet—not brought into fetters:  
As one falls before the sons of wickedness, fellest thou.

**ABO**, a city and seaport, and chief town of the district of the same name in the Russian province of Finland, is situated in N. lat. 60° 26', E. long. 22° 19', on the Aura-joki, about 3 miles from where it falls into the Gulf of Bothnia. It was a place of importance when Finland formed part of the kingdom of Sweden, and the inhabitants of the city and district are mostly of Swedish descent. By the treaty of peace concluded here between Russia and Sweden on 17th August 1743, a great part of Finland was ceded to the former. Abo continued to be the capital of Finland till 1819. In November 1827, nearly the whole city was burnt down, the university and its valuable library

being entirely destroyed. Before this calamity Abo contained 1100 houses, and 13,000 inhabitants; and its university had 40 professors, more than 500 students, and a library of upwards of 30,000 volumes, together with a botanical garden, an observatory, and a chemical laboratory. The university has since been removed to Helsingfors. Abo is the seat of an archbishop, and of the supreme court of justice for South Finland; and it has a cathedral, a town-hall, and a custom-house. Sail-cloth, linen, leather, and tobacco are manufactured; shipbuilding is carried on, and there are extensive saw-mills. There is also a large trade in timber, pitch, and tar. Vessels drawing 9 or 10 feet come up to the town, but ships of greater draught are laden and discharged at the mouth of the river, which forms an excellent harbour and is protected. Population in 1867, 13,109.

**ABOLITIONIST.** See **SLAVERY**.

**ABOMASUM**, *caillette*, the fourth or rennet stomach of Ruminantia. From the *omasum* the food is finally deposited in the abomasum, a cavity considerably larger than either the second or third stomach, although less than the first. The base of the abomasum is turned to the *omasum*. It is of an irregular conical form. It is that part of the digestive apparatus which is analogous to the single stomach of other Mammalia, as the food there undergoes the process of chymification, after being macerated and ground down in the three first stomachs.

**ABOMEY**, the capital of Dahomey, in West Africa, is situated in N. lat. 7°, E. long. 2° 4', about 60 miles N. of Whydah, the port of the kingdom. It is a clay-built town, surrounded by a moat and mud walls, and occupies a large area, part of which is cultivated. The houses stand apart; there are no regular streets; and the place is very dirty. It has four larger market-places, and trade is carried on in palm-oil, ivory, and gold, Mohammedan traders from the interior resorting to its markets. The town contains the principal palace of the king of Dahomey. It is the scene of frequent human sacrifices, a "custom" being held annually, at which many criminals and captives are slain; while on the death of a king a "grand custom" is held, at which sometimes as many as 2000 victims have perished. The slave-trade is also prosecuted, and the efforts of the British Government to induce the king to abolish it and the "customs" have proved unsuccessful. Population, about 30,000. See **DAHOMY**.

**ABORIGINES**, originally a proper name given to an Italian people who inhabited the ancient Latium, or country now called *Campagna di Roma*. Various derivations of this name have been suggested; but there can be scarcely any doubt that the usual derivation (*ab origine*) is correct, and that the word simply indicated a settled tribe, whose origin and earlier history were unknown. It is thus the equivalent of the Greek *autochthones*. It is therefore, strictly speaking, not a proper name at all, although, from being applied to one tribe (or group of tribes), it came to be regarded as such. Who the Aborigines were, or whence they came, is uncertain; but various traditions that are recorded seem to indicate that they were an Oscan or Opican tribe that descended from the Apennines into Latium, and united with some Pelasgic tribe to form the Latins. The stories about Æneas's landing in Italy represent the Aborigines as at first opposing and then coalescing with the Trojans, and state that the united people then assumed the name of *Latins*, from their king *Latinus*. These traditions clearly point to the fact that the Latins were a mixed race, a circumstance which is proved by the structure of their language, in which we find numerous words closely connected with the Greek, and also numerous words that are of an entirely different origin. These non-Greek words are mostly related to the dialects of the

Opican tribes. In modern times the term *Aborigines* has been extended in signification, and is used to indicate the inhabitants found in a country at its first discovery, in contradistinction to colonies or new races, the time of whose introduction into the country is known.

**ABORTION**, in *Midwifery* (from *aborior*, I perish), the premature separation and expulsion of the contents of the pregnant uterus. When occurring before the eighth lunar month of gestation, *abortion* is the term ordinarily employed, but subsequent to this period it is designated *premature labour*. The present notice includes both these terms. As an accident of pregnancy, abortion is far from uncommon, although its relative frequency, as compared with that of completed gestation, has been very differently estimated by accoucheurs. It is more liable to occur in the earlier than in the later months of pregnancy, and it would also appear to occur more readily at the periods corresponding to those of the menstrual discharge. Abortion may be induced by numerous causes, both of a local and general nature. Malformations of the pelvis, accidental injuries, and the diseases and displacements to which the uterus is liable, on the one hand; and, on the other, various morbid conditions of the ovum or placenta leading to the death of the fœtus, are among the direct local causes of abortion. The general causes embrace certain states of the system which are apt to exercise a more or less direct influence upon the progress of uterogestation. A deteriorated condition of health, whether hereditary or as the result of habits of life, certainly predisposes to the occurrence of abortion. Syphilis is known to be a frequent cause of the death of the fœtus. Many diseases arising in the course of pregnancy act as direct exciting causes of abortion, more particularly the eruptive fevers and acute inflammatory affections. Prolonged irritation in other organs may, by reflex action, excite the uterus to expel its contents. Strong impressions made upon the nervous system, as by sudden shocks and mental emotions, occasionally have a similar effect. Further, certain medicinal substances, particularly ergot of rye, borax, savin, tansy, and cantharides, are commonly believed to be capable of exciting uterine action, but the effects, as regards at least early pregnancy, are very uncertain, while the strong purgative medicines sometimes employed with the view of procuring abortion have no effect whatever upon the uterus, and can only act remotely and indirectly, if they act at all, by irritating the alimentary canal. In cases of poisoning with carbonic acid, abortion has been observed to take place, and the experiments of Dr Brown Sequard show that anything interfering with the normal oxygenation of the blood may cause the uterus to contract and expel its contents. Many cases of abortion occur without apparent cause, but in such instances the probability is that some morbid condition of the interior of the uterus exists, and the same may be said of many of those cases where the disposition to abort has become habitual. The tendency, however, to the recurrence of abortion in persons who have previously miscarried is well known, and should ever be borne in mind with the view of avoiding any cause likely to lead to a repetition of the accident. Abortion resembles ordinary labour in its general phenomena, excepting that in the former hemorrhage often to a large extent forms one of the leading symptoms. The treatment of abortion embraces the means to be used by rest, astringents, and sedatives, to prevent the occurrence when it merely threatens; or when, on the contrary, it is inevitable, to accomplish as speedily as possible the complete removal of the entire contents of the uterus. The artificial induction of premature labour is occasionally resorted to by accoucheurs under certain conditions involving the safety

of the mother or the fœtus. For *Criminal Abortion*, see **MEDICAL JURISPRUDENCE**.

**ABOUKIR**, a small village on the coast of Egypt, 13 miles N.E. of Alexandria, containing a castle which was used as a state prison by Mehmet Ali. Near the village, and connected with the shore by a chain of rocks, is a small island remarkable for remains of ancient buildings. Stretching to the eastward as far as the Rosetta mouth of the Nile is the spacious bay of Aboukir, where Nelson fought "the Battle of the Nile," defeating and almost destroying the French fleet that had conveyed Napoleon to Egypt. It was near Aboukir that the expedition to Egypt, under Sir Ralph Abercromby, in 1801, effected a landing in the face of an opposing force.

**ABRABANEL**, ISAAC (called also *Abrahamel*, *Abarbanel*, *Barbanel*, and *Evaranella*), a celebrated Jewish statesman, philosopher, theologian, and commentator, was born at Lisbon in 1437. He belonged to an ancient family that claimed descent from the royal house of David, and his parents gave him an education becoming so renowned a lineage. He held a high place in the favour of King Alphonso V., who intrusted him with the management of important state affairs. On the death of Alphonso in 1481, his counsellors and favourites were harshly treated by his successor John; and Abrabanel was, in consequence, compelled to flee to Spain, where he held for eight years (1484-1492), the post of a minister of state under Ferdinand and Isabella. When the Jews were banished from Spain in 1492, no exception was made in Abrabanel's favour. He afterwards resided at Naples, Corfu, and Monopoli, and in 1503 removed to Venice, where he held office as a minister of state till his death in 1508. Abrabanel was one of the most learned of the rabbis. His writings are chiefly exegetical and polemical; he displays in them an intense antipathy to Christianity, though he lived on terms of friendship with Christians. He wrote commentaries on the greater part of the Old Testament, in a clear but somewhat diffuse style, anticipating much that has been advanced as new by modern theologians.

**ABRACADABRA**, a meaningless word once supposed to have a magical efficacy as an antidote against agues and other fevers. Ridiculously minute directions for the proper use of the charm are given in the *Præcepta de Medicina* of Serenus Sammonicus. The paper on which the word was written had to be folded in the form of a cross, suspended from the neck by a strip of linen so as to rest on the pit of the stomach, worn in this way for nine days, and then, before sunrise, cast behind the wearer into a stream running to the east. The letters of this word were usually arranged to form a triangle in one or other of the following ways:—

|             |             |
|-------------|-------------|
| ABRACADABRA | ABRACADABRA |
| ABRACADABE  | BRACADABR   |
| ABRACADAB   | RACADAB     |
| ABRACADA    | ACADA       |
| ABRACAD     | CAD         |
| ABRACA      | ▲           |
| ABRAO       |             |
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**ABRAHAM** or **ABRAM**, father of the Israelite race, was the first-born son of Terah, a Shemite, who left Ur of the Chaldees, in the north-east of Mesopotamia, along with Abram, Sarai, and Lot, and turned westwards in the direction of Canaan. Abram had married his half-sister Sarai, who was ten years younger than himself; and though such relationship was afterwards forbidden by the law, it was common in ancient times, both among other



peoples, and among the Hebrews themselves at least before Moses. The cause of Terah's removing from his native country is not given. Having come to Haran, he abode there till his death, at the age of 205. According to Genesis xii., Abram left Haran when he was 75 years of age, that is, before the death of his father, in consequence of a divine command, to which was annexed a gracious promise, "And I will make of thee a great nation, and I will bless thee, and make thy name great; and thou shalt be a blessing. And I will bless them that bless thee, and curse him that curseth thee; and in thee shall all families of the earth be blessed" (xii. 2, 3). Another tradition makes him leave Haran only after Terah's decease (Acts vii. 4). The later account is that Abram's departure was the result of religious considerations, because he had already become emancipated from surrounding idolatry. Perhaps the desire of a nomadic life, the love of migration natural to an Oriental, had more to do with his pilgrimage than a spiritual impulse from within; but it is likely that his culture advanced in the course of his sojournings, and that he gradually attained to purer conceptions of duty and life. Traditions subsequent to the Jehovistic represent him as driven forth by the idolatrous Chaldeans (Judith v. 6, &c.) on account of his monotheistic doctrines, and then dwelling in Damascus as its king (Josephus's *Antiquities*, i. 7). The true cause of departure may be suggested by Nicolaus of Damascus saying that he came out of Chaldaea with an army. The leader of a horde, worsted in some encounter or insurrection, he emigrated at the head of his adherents in quest of better fortunes. The word *redeemed*, in Isaiah xxix. 22, out of which Ewald conjectures so much, as if Abram had been rescued from great bodily dangers and battles, does not help the portrait, because it means no more than the patriarch's migration from heathen Mesopotamia into the Holy Land. Journeying south-west to Canaan with his wife and nephew, he arrived at Sichem, at the oak of the *oak of the seer* or *prophet*, where Jehovah appeared to him, assuring him for the first time that his seed should possess the land he had come to. He travelled thence southward, pitching his tent east of Bethel. Still proceeding in the same direction, he arrived at the Negeb, or most southern district of Palestine, whence a famine forced him down to Egypt. His plea that Sarai was his sister did not save her from Pharaoh; for she was taken into the royal harem, but restored to her husband in consequence of divine chastisements inflicted upon the lawless possessor of her person, leading to the discovery of her true relationship. The king was glad to send the patriarch away under the escort and protection of his men. A similar thing is said to have subsequently happened to Sarai at Gerar with the Philistine king Abimelech (Genesis xx.), as also to Rebekah, Isaac's wife (xxvi.). The three narratives describe one and the same event in different shapes. But the more original (the junior Elohistic)<sup>1</sup> is that of the 20th chapter, so that Gerar was the scene, and Abimelech the offender; while the later Jehovistic narrative (xii.) deviates still more from verisimilitude. Though this occurrence, however, belongs to the southern borders of Palestine, we need not doubt the fact of Abram's sojourn in Egypt, especially as he had an Egyptian slave (Genesis xvi.). How long the patriarch remained there is not related; nor are the influences which the religion, science, and learning of that civilised land had upon him alluded to. That they acted beneficially upon his mind, enlightening and enlarging it, can scarcely be doubted. His religious conceptions were transformed.

The manifold wisdom of Egypt impressed him. intercourse with men far advanced in civilisation taught him much. Later tradition speaks of his communicating to the Egyptians the sciences of arithmetic and astronomy (Josephus i. 7); but this is founded upon the notion entertained at the time of the civilised Chaldeans of Babylon, whereas Ur of the Chaldees was a district remote from the subsequent centre of recondite knowledge. Abram received more than he imparted, for the Egyptians were doubtless his superiors in science. He found the rite of circumcision in use. There, too, he acquired great substance—flocks and herds, male and female slaves. After returning to Canaan, to his former locality, Abram and Lot separated, because of disputes between their herdsmen, there not being sufficient room for all their cattle in common. After this separation the possession of Canaan was again assured to Abram and to his seed, who should be exceedingly numerous. This is the third theocratic promise he received. He is also commanded by Jehovah to walk through it in its length and breadth as a token of inheritance,—a later Jehovistic tradition that must be judged according to its inherent verisimilitude. Abram settled again at the oak of Mamre near Hebron. This was his headquarters. After Lot had been taken prisoner in the expedition of the kings of Shinar, Ellasar, Elam, and Goyim, against the old inhabitants of Basan, Ammonitis, Moabitiss, Edomitiss, and others besides, Abram gave chase to the enemy, accompanied by his 318 slaves and friendly neighbours, rescuing his nephew at Hobab, near Damascus. On his return, the royal priest Melchizedek of Salem came forth to meet him with refreshments, blessed the patriarch, and received from him the tithe of the spoils. The king acted generously towards the victor, and was still more generously treated in return.

Jehovah again promised to Abram a numerous offspring, with the possession of Canaan. He also concluded a covenant with him in a solemn form, and revealed the fortunes of his posterity in Egypt, with their deliverance from bondage. In consequence of the barrenness of Sarai, she gave her handmaid Hagar to Abram, who, becoming pregnant by him, was haughtily treated by her mistress, and fled towards Egypt. But an angel met her in the desert and sent her back, telling of a numerous race that should spring from her. Having returned, she gave birth to Ishmael, in the 86th year of Abram's age.

Again did Jehovah appear to the patriarch, promising as before a multitudinous seed, and changing his name in conformity with such promise. He assured him and his posterity of the possession of Canaan, and concluded a covenant with him for all time. At the institution of circumcision on this occasion, Sarai's name was also changed, because she was to be the maternal progenitor of the covenant people through Isaac her son. Abram, and all the males belonging to him, were then circumcised. He had become acquainted with the rite in Egypt, and transferred it to his household, making it a badge of distinction between the worshippers of the true God and the idolatrous Canaanites—the symbol of the flesh's subjection to the spirit. Its introduction into the worship of the colony at Mamre indicated a decided advance in Abram's religious conceptions. He had got beyond the cruel practice of human sacrifice. The gross worship of the Canaanites was left behind; and the small remnant of it which he retained comported with a faith approaching monotheism. Amid prevailing idolatry this institution was a protection to his family and servants—a magic circle drawn around them. But, though powerful and respected wherever his name was known, he confined the rite to his own domestics, without attempting to force it on the inhabitants of the land where he sojourned. The punishment of death

<sup>1</sup> Three documents at least are traceable in the Pentateuch; the Elohistic, the junior Elohistic, and the Jehovistic. These were put together by a redactor. Nearly the whole of the fifth book was added by the Deuteronomist.

for neglecting it, because the uncircumcised person was thought to be a breaker of the covenant and a despiser of its Author, seems a harsh measure on the part of Abram; yet it can hardly be counted an arbitrary transference of the later Levitical severities to the progenitor of the race, since it is in the Elohist.

Accompanied by two angels, Jehovah appeared again to Abram at the oak of Mamre, accepted his proposed hospitality, and promised him a son by Sarai within a year. Though she laughed incredulously, the promise was definitely repeated. When the angels left, Jehovah communicated to Abram the divine purpose of destroying the dwellers in Sodom because of their wickedness, but acceded to the patriarch's intercession, that the cities of the plain should be spared if ten righteous men could be found in them. The two angels, who had gone before, arrived at Sodom in the evening, and were entertained by Lot, but threatened with shameful treatment by the depraved inhabitants. Seeing that the vengeance of Heaven was deserved, they proceeded to execute it, saving Lot with his wife and two daughters, and sparing Zoar as a place of refuge for them. Jehovah rained down fire and brimstone from heaven, turning all the Jordan district to desolation, so that when Abram looked next morning from the spot where Jehovah and himself had parted, he saw a thick smoke ascend from the ruins.

Abram then journeyed from Hebron to the Negeb, settled between Kadesh and Shur in Gerar, where Sarai is said to have been treated as a prior account makes her to have been in Egypt. At the patriarch's prayer the plague inflicted on the king and his wives was removed. This is a duplicate of the other story. Whatever historical truth the present narrative has belongs to an earlier period of Abram's life. His second removal to Gerar originated in the former journeying through it into Egypt. He must have remained in the neighbourhood of Hebron, his first settlement, where Isaac was born according to the Elohist account. After the birth of the legitimate heir, succeeding events were the expulsion of Hagar and Ishmael from the paternal home, and the making of a covenant between Abimelech and Abram at Beersheba. Here Abram "called on the name of the Lord," and is said to have planted a noted tamarisk in commemoration of the event.

Abram was now commanded by God to offer up Isaac in the land of Moriah. Proceeding to obey, he was prevented by an angel just as he was about to slay his son, and sacrificed a ram that presented itself at the time. In reward of his obedience he received the promise of a numerous seed and abundant prosperity. Thence he returned to Beersheba.

Sarai died and was buried in the cave of Machpelah near Hebron, which Abram purchased, with the adjoining field, from Ephron the Hittite. The measures taken by the patriarch for the marriage of Isaac are circumstantially described. His steward Eliezer was sent to the country and kindred of Abram to find a suitable bride, which he did in Haran, whither he was divinely conducted. Rebekah appeared as the intended one; she parted from Bethuel and her family with their full approbation, was brought to Isaac, and became a maternal ancestor of the chosen people.

It is curious that, after Sarah's death, Abram should have contracted a second marriage with Keturah, and begotten six sons. The Chronicles, however, make her his concubine (1 Chron. i. 32), so that these children may have been born earlier. Probably the narrative intends to account for the diffusion of Abram's posterity in Arabia. Keturah's sons were sent away with gifts from their home into Arabia, and all the father's substance was given to Isaac. The patriarch died at the age of 175 years,

and was buried by Isaac and Ishmael beside Sarai in Machpelah. The book of Genesis gives two lists of Arab tribes, descended partly from Abram and Keturah, partly from him and Hagar or Ishmael. These dwell in Arabia Deserta and Petraea, as also in the northern half of Arabia Felix.

1. We cannot adopt the opinion of Von Bohlen and Dozy that Abram is a mythical person. He must be regarded as a historical character, though the accounts of his life have mythical elements intermingled with much that is traditional or legendary. The difficulty of separating the historic from the merely traditional, hinders the presentation of a natural portrait. Later legends have invested him with extraordinary excellence. They have made him a worshipper of Jehovah, a prophet, the friend of God, favoured with visible manifestations of His presence, and receiving repeated promises of the most far-reaching character. He is the typical ancestor of the chosen race, living under the constant guidance of God, prospering in worldly goods, delivered from imminent perils. A superhuman halo surrounds him. It is the Jehovahist in particular who invests him with the marvellous and improbable, connecting him with altars and sacrifices—a cultus posterior to both his time and mental development—making him the subject of theophanies, talking familiarly to Jehovah himself, and feeding angels with flesh. The Elohist's descriptions are simpler. His patriarchs are usually colourless men, upright and plain. They have neither characteristic features nor distinct outline. Abram stands out an honest, peaceable, generous, high-minded patriarch; a prince, rich, powerful, and honoured, fitted for rule, and exercising it with prudence. We need not expect a full history of the man from writers long posterior, the representatives of popular traditions. Only fragments of the life are given, designed to show his greatness. Legend assigned ideal lineaments to the progenitor whom a remote antiquity shrouded with its hoary mantle, and thus he became a model worthy of imitation.

2. The biblical sources of his biography are three at least; and sometimes all appear in a single chapter, as in Gen. xxii., which describes the severest trial of faith. The oldest or Elohim-document is seen in verses 20-24, which link on to chap. xxi. 2-5, from the same. The rest of the chapter belongs to the junior Elohist, except verses 14-18, added by the Jehovahist to connect Abram's sacrifice with Jerusalem. These different documents, out of which the general narrative was finally put together by a redactor, create diversities and contradictions. Thus the Elohist makes Abram laugh at the announcement of a son by Sarai (xvii. 17); the Jehovahist, jealous for the patriarch's honour, assigns the laughter to the woman as a sign of incredulity (xviii. 12).

3. The account of the change of names given to Abram and Sarai when circumcision was instituted, cannot be regarded as historical. The Elohist says that Abram became Abraham, the latter meaning *father of much people*. But the Hebrew tongue has no word *rahām*, and no root with the three letters רהם. Hence the Jews found the etymology a puzzle.<sup>1</sup> The old reading was undoubtedly Abram and Sarai, though the later Jews expressly forbade Abram, either in speaking or writing. The difference is one of mere orthography. The forms אַבְרָם and אֲרָם are cognate ones, as are שָׂרָה and שָׂרָא. The etymologising propensity of the Elohist is well known. The names signify *father of height* and *princess* respectively.

4. The religion of Abram was not pure Jehovahism. According to Exodus vi. 3, the name Jehovah was unknown before Moses. Pure Jehovahism was a growth not reached

<sup>1</sup> See Beer's *Leben Abraham's*, pp. 150, 151.



before the prophets. It was a late development, the creed of the most spiritual teachers, not of the people generally. Abram was a distinguished Oriental sheikh, who laid aside the grossness of idolatry, and rose by degrees, through contact with many peoples and his own reflection, to the conception of a Being higher than the visible world, the God of the light and the sun. He was a civilised nomad, having wider and more spiritual aspirations than the peoples with whom he lived. As a worshipper of God, his faith was magnified by later ages throwing back their more advanced ideas into his time, because he was the founder of a favoured race, the type of Israel as they were or should be.

5. The leading idea forming the essence of the story respecting Abram's sacrifice of Isaac, presents some difficulty of explanation. The chapter did not proceed from the earliest writer, but from one acquainted with the institution of animal sacrifices. That the patriarch was familiar with human sacrifices among the peoples round about is beyond a doubt. Was he tempted from within to comply, on one occasion, with the prevailing custom; or did the disaffected Canaanites call upon him to give such proof of devotion to his God? Perhaps there was a struggle in his mind between the better ideas which led to the habitual renunciation of the barbarous rite, and scruples of the universal impropriety attaching to it. The persuasion that it could never be allowed may have been shaken at times. The general purport of the narrative is to place in a strong light the faith of one prepared to make the most costly sacrifice in obedience to the divine command, as well as God's aversion to human offerings.

6. It is impossible to get chronological exactness in Abram's biography, because it is composed of different traditions incorporated with one another, the product of different times, and all passing through the hands of a later redactor for whom the true succession of events was not of primary importance. The writers themselves did not know the accurate chronology, having to do with legends as well as facts impregnated with the legendary, which the redactor afterwards altered or adapted. The Elohist is much more chronological than the other writers. It is even impossible to tell the time when Abram lived. According to Lepsius, he entered Palestine 1700–1730 B.C.; according to Bunsen, 2886; while Schenkel gives 2130–2140 B.C. In Beer's *Leben Abraham's* his birth is given 1948 A.M., i.e., 2040 B.C.

7. The Midrashim contain a good deal about Abram which is either founded on biblical accounts or spun out of the fancy. Nimrod was king of Babylon at the time. The patriarch's early announcement of the doctrine of one God, his zeal in destroying idols, including those worshipped by his father, his miraculous escape from Nimrod's wrath, his persuading Terah to leave the king's service and go with him to Canaan, are minutely told. During his life he had no fewer than ten temptations. Satan tried to ruin him, after the fiend had appeared at the great feast given when Isaac was weaned, in the form of a poor bent old man, who had been neglected. We can only refer to one specimen of rabbinic dialogue-making. God appeared to Abram by night, saying to him, "Take thy son"—(Abram interrupting), "Which? I have two of them." The voice of God—"Him who is esteemed by you as your only son." Abram—"Each of them is the only son of his mother." God's voice—"Him whom thou lovest." Abram—"I love both." God's voice—"Him whom thou especially lovest." Abram—"I cherish my children with like love." God's voice—"Now, then, take Isaac." Abram—"And what shall I begin with in him?" God's voice—"Go to the land where at my call mountains will rise up out of valleys . . . to Moriah, and offer thy son Isaac as a holocaust."

Abram—"Is it a sacrifice I shall offer, Lord? Where is the priest to prepare it?" "Be thou invested with that dignity as Shem was formerly." Abram—"But that land counts several mountains, which shall I ascend?" "The top of the mountain where thou shalt see my glory veiled in the clouds," &c. (Beer, pp. 59, 60.)

The Arabic legends about Ibrahim are mostly taken from the Jewish fountain, very few being independent and pre-Islamite. Mohammed collected all that were current, and presented them in forms best suited to his purpose. His sources were the biblical accounts and later Jewish legends. Those about the patriarch building the Kaaba along with Ishmael, his giving this son the house and all the country in which it was, his going as a pilgrim to Mecca every year, seeing Ishmael, and then returning to his own land, Syria, his foot-print on the black stone of the temple, and similar stories, are of genuine Arabic origin. The rest are Jewish, with certain alterations. The collected narratives of the Arabic historians are given by Tabari, constituting a confused mass of legends drawn from the Old Testament, the Koran, and the Rabbins. (See Ewald's *Geschichte des Volkes Israel*, vol. i. pp. 440–484, third edition; Bertheau's *Zur Geschichte der Israeliten*, p. 206, et seq.; Tuch's *Kommentar ueber die Genesis*, 1838; Knobel's *Die Genesis*, 1852; Dozy's *Die Israeliten zu Mekka*, p. 16, et seq.; B. Beer's *Leben Abraham's nach Auffassung der jüdischen Sage*, 1859; *Chronique d'Abou Djafar Mohammed Tabari*, par L. Dubouix, tome premier, chapters 47–60; Chwolson's *Sabier und der Ssabismus*, vol. ii.) (s. d.)

ABRAHAM-A-SANCTA-CLARA, was born at Krähenheimstetten, a village in Suabia, on the 4th of June 1642. His family name was Ulrich Megerle. In 1662 he joined the order of Barefooted Augustinians, and assumed the name by which alone he is now known. In this order he rose step by step until he became prior provincialis and definitor of his province. Having early gained a great reputation for pulpit eloquence, he was appointed court preacher at Vienna in 1669. There the people flocked in crowds to hear him, attracted by the force and homeliness of his language, the grotesqueness of his humour, and the impartial severity with which he lashed the follies of all classes of society. The vices of courtiers and court-life in particular were exposed with an admirable intrepidity. In general he spoke as a man of the people in the language of the people, the predominating quality of his style, which was altogether unique, being an overflowing and often coarse wit. There are, however, many passages in his sermons in which he rises to loftier thought, and uses more refined and dignified language. He died at Vienna on the 1st December 1709. In his published writings Abraham-a-Sancta-Clara displayed much the same qualities as in the pulpit. Perhaps the most favourable specimen of his style is furnished in *Judas der Erschelm*. His works have been several times reproduced in whole or part, though with many spurious interpolations, within the last thirty years, and have been very extensively read by both Protestants and Catholics. A selection was issued at Heilbronn in 1845, and a complete edition in 21 vols. appeared at Passau and Lindau, in 1835–54.

ABRANTES, a town of Portugal, Estremadura province, on the Tagus, about 70 miles N.E. of Lisbon, delightfully situated on the brow of a hill, of which the slopes are covered with olive trees, gardens, and vineyards. It has considerable trade with Lisbon, particularly in fruit, corn, and oil. The town is strongly fortified, and is an important military position. At the convention of Cintra it was surrendered to the British. Junot derived from it his title of Duke of Abrantes. Population about 6000.

ABRANTES, DUKE AND DUCHESS OF. See JUNOT.

ABRAXAS, or ABRASAX, a word engraved on certain antique stones, which were called on that account *Abraxas stones*, and were used as amulets or charms. The Basilidians, a Gnostic sect, attached importance to the word, if, indeed, they did not bring it into use. The letters of ἀβραξάς, in the Greek notation, make up the number 365, and the Basilidians gave the name to the 365 orders of spirits, which, as they conceived, emanated in succession from the Supreme Being. These orders were supposed to occupy as many heavens, each fashioned like, but inferior to that above it; and the lowest of the heavens was thought to be the abode of the spirits who formed the earth and its inhabitants, and to whom was committed the administration of its affairs. The Abraxas stones, which are frequently to be met with in the cabinets of the curious, are of very little value. In addition to the word *Abraxas* and other mystical characters, they have often engraved on them cabalistic figures. The commonest of these have the head of a fowl, and the arms and bust of a man, and terminate in the body and tail of a serpent.

ABRUZZO, originally one of the four provinces of the continental part of the kingdom of the two Sicilies, afterward subdivided into Abruzzo Ulteriore I., Abruzzo Ulteriore II., and Abruzzo Citeriore, which were so named from their position relative to Naples, and now form three of the provinces of the kingdom of Italy. The district, which was the most northerly part of the kingdom of the two Sicilies, is bounded by the Adriatic on the E., and by the provinces of Ascoli Piceno on the N., Umbria and Rome on the W., and Terra di Lavoro, Molise, and Capitanata on the S. The Abruzzi provinces have an area of nearly 4900 English square miles, and extend from N. lat. 41° 40' to 42° 55'. Though presenting to the Adriatic a coast of about 80 miles in length, they have not a single good port. This territory is mostly rugged, mountainous, and covered with extensive forests, but contains also many fertile and well-watered valleys. The Apennines traverse its whole extent, running generally from N.W. to S.E., and here attaining their greatest elevation. Near Aquila is Monte Corno, the loftiest peak of that chain, called *Il gran Sasso d'Italia*, or the great rock of Italy, which rises to the height of 9813 feet. Monte Majella and Monte Velino attain the height of 9500 and 8792 feet respectively. From the main range of the Apennines a number of smaller branches run off towards the west. The country is watered by numerous small rivers, most of which fall into the Adriatic. They are often suddenly swollen by the rains, especially in the spring, and thus cause considerable damage to the lands through which they pass. The principal rivers are the Tronto, Trentino, Pescara, and Sangro. In Abruzzo Ulteriore II. is lake Celano or Lago di Fucino, the *Lacus Fucinus* of the Romans, now reduced to about one-third of its former extent. The climate varies with the elevation, but, generally speaking, is temperate and healthy. Agriculture is but little understood or attended to, although in many of the lower parts of the country the land is fertile. The rivers are not embanked, nor is irrigation practised; so that the best of the land is frequently flooded during the rainy season, and parched in the heat of summer. The principal productions are corn, hemp, flax, almonds, olives, figs, grapes, and chestnuts. In the neighbourhood of Aquila saffron is extensively cultivated, although not to such an extent as formerly. The rearing and tending of sheep is the chief occupation of the inhabitants of the highlands; and the wool, which is of a superior quality, is an important article of commerce, while the skins are sent in large quantities to the Levant. Bears, wolves, and wild boars inhabit the moun-

tain fastnesses; and in the extensive oak forests numerous herds of swine are fed, the hams of which are in high repute. The manufactures are very inconsiderable, being chiefly woollen, linen, and silk stuffs, and earthen and wood wares. Abruzzo was of great importance to the kingdom of Naples, being its chief defence to the north, and presenting almost insurmountable difficulties to the advance of an enemy. The country is now free of the daring brigands by whom it was long infested. The inhabitants are a stout, well-built, brave, and industrious race. Their houses are generally miserable huts; their food principally maize, and their drink bad wine. The railway from Ancona to Brindisi passes through Abruzzo Ulteriore I. and Abruzzo Citeriore, skirting the coast; and a line has been projected from Pescara, by Popoli, the Lago di Fucino, and the valley of the Liris, to join the railway from Rome to Naples, and thus open up the interior of the country. The line is open for traffic between Pescara and Popoli.

ABRUZZO ULTERIORE I. is the most northerly of the three provinces, and has an area of 1283 square miles, with a population in 1871 of 245,684. The western part of the province is very mountainous, the highest crest of the Apennines dividing it from Abruzzo Ulteriore II. The valleys possess a rich soil, well watered by rivulets and brooks in the winter and spring, but these are generally dried up in the summer months. The streams run mostly into the Pescara, which bounds the province towards Abruzzo Citeriore, or into the Tronto, which is the northern boundary. The city of Teramo is the capital of the province.

ABRUZZO ULTERIORE II. is an inland district, nearly covered with mountains of various heights, one of which is the *Gran Sasso*. There are no plains; but among the mountains are some beautiful and fruitful valleys, watered by the various streams that run through them. None of the rivers are navigable. The province has an area of 2510 square miles, and in 1871 contained 332,782 inhabitants. Its chief town is Aquila.

ABRUZZO CITERIORE lies to the south and east of the other two provinces. It is the least hilly of the three, but the Apennines extend through the south-west part. They, however, gradually decline in height, and stretch away into plains of sand and pebbles. The rivers all run to the Adriatic, and are very low during the summer months. The soil is not very productive, and agriculture is in a very backward state; the inhabitants prefer the chase and fishing. The province contains 1104 square miles, with a population of 340,299 in 1871. Its chief town is Chieti.

ABSALOM (*שִׁשְׁבַּז*, *father of peace*), the third son of David, king of Israel. He was deemed the handsomest man in the kingdom. His sister Tamar having been violated by Amnon, David's eldest son, Absalom caused his servants to murder Amnon at a feast, to which he had invited all the king's sons. After this deed he fled to the kingdom of his maternal grandfather, where he remained three years; and it was not till two years after his return that he was fully reinstated in his father's favour. Absalom seems to have been by this time the eldest surviving son of David, but he was not the destined heir of his father's throne. The suspicion of this excited the impulsive Absalom to rebellion. For a time the tide of public opinion ran so strong in his favour, that David found it expedient to retire beyond the Jordan. But, instead of adopting the prompt measures which his sagacious counsellor Ahithophel advised, Absalom loitered at Jerusalem till a large force was raised against him, and when he took the field his army was completely routed. The battle was fought in the forest of Ephraim; and Absalom, caught in



the boughs of a tree by the superb hair in which he gloried, was run through the body by Joab. The king's grief for his worthless son vented itself in the touching lamentation—"O my son Absalom, my son, my son Absalom! would God I had died for thee, O Absalom, my son, my son!"

ABSALON, Archbishop of Lund, in Denmark, was born in 1128, near Soroe in Zealand, his family name being Axel. In 1148 he went to study at Paris, where a college for Danes had been established. He afterwards travelled extensively in different countries; and returning to Denmark in 1157, was the year after chosen Bishop of Roskilde or Rothschild. Eloquent, learned, endowed with uncommon physical strength, and possessing the confidence of the king, Waldemar I., known as the Great, Absalon held a position of great influence both in the church and state. In that age warlike pursuits were not deemed inconsistent with the clerical office, and Absalon was a renowned warrior by sea and land, as well as a zealous ecclesiastic, his avowed principle being that "both swords, the spiritual and the temporal, were entrusted to the clergy." To his exertions as statesman and soldier Waldemar was largely indebted for the independence and consolidation of his kingdom. In 1177 he was chosen by the chapter Archbishop of Lund and Primate of the church, but he declared himself unwilling to accept the appointment; and when an attempt was made to install him by force, he resisted, and appealed to Rome. The Pope decided that the choice of the chapter must be respected, and commanded Absalon to accept the Primacy on pain of excommunication. He was consecrated accordingly by the papal legate Gelandius in 1178. He set the Cistercian monks of Soroe the task of preparing a history of the country, the most valuable result being the *Danish Chronicle* of Saxo Grammaticus, who was secretary to Absalon and his companion in an expedition against the Wendish pirates. A tower or castle which the archbishop caused to be built as a defence against these pirates, was the commencement of the present capital, Copenhagen, which from this circumstance is sometimes known in history as Axelstadt. The archbishop died in 1201, in the monastery at Soroe, and was buried in the parish church, where his grave may still be seen.

ABSCISS, in *Surgery* (from *abscedo*, to separate), a collection of pus among the tissues of the body, the result of inflammation. Abscesses are divided into acute and chronic. See *SURGERY*.

ABSINTHE, a liqueur or aromatized spirit, prepared by pounding the leaves and flowering tops of various species of wormwood, chiefly *Artemisia Absinthium*, along with angelica root (*Archangelica officinalis*), sweet flag root (*Acorus Calamus*), the leaves of dittany of Crete (*Origanum Dictamnus*), star-anise fruit (*Illicium anisatum*), and other aromatics, and macerating these in alcohol. After soaking for about eight days the compound is distilled, yielding an emerald-coloured liquor, to which a proportion of an essential-oil, usually that of anise, is added. The liqueur thus prepared constitutes the genuine *Estrait d'Absinthe* of the French; but much of an inferior quality is made with other herbs and essential oils, while the adulterations practised in the manufacture of absinthe are very numerous and deleterious. In the adulterated liqueur the green colour is usually produced by turmeric and indigo, but the presence of even cupric sulphate (blue vitriol) as a colouring ingredient has been frequently detected. In commerce two varieties of absinthe are recognised—common and Swiss absinthe—the latter of which is prepared with highly concentrated spirit; and when really of Swiss manufacture, is of most trustworthy quality as regards the herbs used in its preparation. The chief seat of the manufacture is in the canton of Neuchâtel in Switzerland, although

absinthe distilleries are scattered generally throughout Switzerland and France. The liqueur is chiefly consumed in France, but there is also a considerable export trade to the United States of America. In addition to the quantity distilled for home consumption in France, the amount imported from Switzerland in recent years has not been less than 2,000,000 gallons yearly. The introduction of this beverage into general use in France is curious. During the Algerian war (1844-47) the soldiers were advised to mix absinthe with their wine as a febrifuge. On their return they brought with them the habit of drinking it, which is now so widely disseminated in French society, and with such disastrous consequences, that the custom is justly esteemed a grave national evil. A French physician, M. Legrand, who has studied the physiological effects of absinthe drinking, distinguishes two trains of results according as the victim indulges in violent excesses of drinking or only in continuous steady tipping. In the case of excessive drinkers there is first the feeling of exaltation peculiar to a state of intoxication. The increasing dose necessary to produce this state quickly deranges the digestive organs, and destroys the appetite. An unappeasable thirst takes possession of the victim, with giddiness, tingling in the ears, and hallucinations of sight and hearing, followed by a constant mental oppression and anxiety, loss of brain power, and, eventually, idiocy. The symptoms in the case of the tippler commence with muscular quiverings and decrease of physical strength; the hair begins to drop off, the face assumes a melancholy aspect, and he becomes emaciated, wrinkled, and sallow. Lesion of the brain follows, horrible dreams and delusions haunt the victim, and gradually paralysis overtakes him and lands him in his grave. It has been denied by a French authority, M. Moreau, that these symptoms are due to wormwood or any of the essential oils contained in absinthe, and he maintains that the strong spirit and such adulterations as salts of copper are sufficient to account for the effects of the liqueur. There is, however, no doubt that proportionately the consumption of absinthe is much more deleterious to the human frame than the drinking of brandy or other strong spirits. The use of absinthe has been prohibited in both the army and navy of France.

ABSOLUTE (from the Latin *absolvere*), having the general meaning of *loosened from*, or *unrestricted*, in which sense it is popularly used to qualify such words as "monarchy" or "power," has been variously employed in philosophy. Logicians use it to mark certain classes of names. Thus a term has been called absolute in opposition to *attributive*, when it signifies something that has or is viewed as having independent existence; most commonly, however, the opposition conveyed is to *relative*. A relative name being taken as one which, over and above the object which it denotes, implies in its signification the existence of another object, also deriving a denomination from the same fact, which is the ground of the first name (Mill), as, e.g., father and son, the non-relative or absolute name is one that has its meaning for and in itself, as man. This distinction is a convenient one, although, as has been observed, it can hardly in perfect strictness be maintained. The so-called absolute name, if used with a meaning, does always stand in some relation, however variable or indefinite, and the meaning varies with the relation. Thus man, which is a word of very different meanings, as, e.g., not woman, not boy, not master, not brute, and so forth, may be said to have them according to the different relations in which it admits of being viewed, or, as it has been otherwise expressed, according to the different notions whose "universe" it composes, along with its different correlatives. From this point of view there is always one relation in which a real thing must stand, namely, the

relation to its contradictory (as not man) within the universe of being; the correlatives, under less general notions, being then generally expressed positively as contraries (woman, boy, master, brute, and so forth, for man). If there is thus no name or notion that can strictly be called absolute, all knowledge may be said to be relative, or of the relative. But the knowledge of an absolute has also been held impossible, on the ground that knowing is itself a relation between a subject and an object; what is known only in relation to a mind cannot be known as absolute. This doctrine, now commonly spoken of under the name of the Relativity of Knowledge, may, indeed, be brought under the former view, in which subject-object marks the relation of highest philosophical significance within the whole universe of things. Keeping, however, the two views apart, we may say with double force that of the absolute there is no knowledge.—(1), because, to be known, a thing must be consciously discriminated from other things; and (2), because it can be known only in relation with a knowing mind. Notwithstanding, there have been thinkers from the earliest times, who, in different ways, and more or less explicitly, allow of no such restriction upon knowledge, or at least consciousness, but, on the contrary, starting from a notion, by the latter among them called the absolute, which includes within it the opposition of subject and object, pass therefrom to the explanation of all the phenomena of nature and of mind. In earlier days the Eleatics, Plato, and Plotinus, in modern times Spinoza, Leibnitz, Fichte, Schelling, Hegel, and Cousin, all have joined, under whatever different forms, in maintaining this view. Kant, while denying the absolute or unconditioned as an object of knowledge, leaves it conceivable, as an idea regulative of the mind's intellectual experience. It is against any such absolute, whether as real or conceivable, that Hamilton and Mansel have taken ground, the former in his famous review of Cousin's philosophy, reprinted in his *Discussions*, the latter in his Bampton Lectures on *The Limits of Religious Thought*, basing their arguments indifferently on the positions as to the Relativity of Knowledge indicated above. For absolute in its more strictly metaphysical use, see METAPHYSICS.

(G. A. R.)

**ABSOLUTION**, a term used in civil and ecclesiastical law, denotes the act of setting free or acquitting. In a criminal process, it signifies the acquittal of an accused person on the ground that the evidence has either disproved or failed to prove the charge brought against him. It is now little used except in Scotch law, in the forms *assolzie* and *absolvitor*. The ecclesiastical usage of the word is essentially different from the civil. It refers to sin actually committed, and denotes the setting of a person free from its guilt, or from its penal consequences, or from both. It is invariably connected with penitence, and some form of confession, the Scripture authority, to which the Roman Catholics, the Greek Church, and Protestants equally appeal, being found in John xx. 23, James v. 16, &c. In the primitive church the injunction of James was literally obeyed, and confession was made before the whole congregation, whose presence and concurrence were reckoned necessary to the validity of the absolution pronounced by the presbyter. In the 4th century the bishops began to exercise the power of absolution in their own right, without recognising the congregations. In consequence of this the practice of private confession (*confessio auricularis*) was established, and became more and more common, until it was rendered imperative once a year by a decree of the fourth Lateran Council (1215). A distinction, indeed, was made for a time between *peccata venialia*, which might be confessed to a layman, and *peccata mortalia*, which could only be confessed to a priest;

but this was ultimately abolished, and the Roman Canon Law now stands, *Nec venialia nec mortalia possumus confiteri sacramentaliter, nisi sacerdoti*. A change in the form of absolution was almost a logical sequence of the change in the nature of the confession. At first the priest acted ministerially as an intercessory, using the formula *absolutionis precativa* or *deprecativa*, which consisted of the words: *Dominus absolvat te—Misereatur tui omnipotens Deus et dimittat tibi omnia peccata tua*. This is still the only form in the Greek Church, and it finds a place in the Roman Catholic service, though it is no longer used in the act of absolution. The Romish form was altered in the 13th century, and the Council of Trent decreed the use of the formula *absolutionis indicativa*, where the priest acts judicially, as himself possessed of the power of binding and loosing, and says, *Ego absolvo te*. Where a form of absolution is used in Protestant Churches, it is simply declarative, the state being only indicated, and in no sense or degree assumed to be caused by the declaration.

**ABSORPTION**, in the animal economy, the function possessed by the absorbent system of vessels of taking up nutritive and other fluids. See PHYSIOLOGY.

**ABSTEMII**, a name formerly given to such persons as could not partake of the cup of the eucharist on account of their natural aversion to wine. Calvinists allowed these to communicate in the species of bread only, touching the cup with their lip; which was by the Lutherans deemed a profanation. Among several Protestant sects, both in Great Britain and America, *abstemii* on a somewhat different principle have recently appeared. These are total abstainers, who maintain that the use of stimulants is essentially sinful, and allege that the wine used by Christ and his disciples at the supper was unfermented. They accordingly communicate in the unfermented "juice of the grape." The difference of opinion on this point has led to a good deal of controversy in many congregations, the solution generally arrived at being to allow both wine and the pure juice of the grape to be served at the communion table.

**ABSTRACTION**, in *Psychology* and *Logic*, is a word used in several distinguishable but closely allied senses. First, in a comprehensive sense, it is often applied to that process by which we fix the attention upon one part of what is present to the mind, to the exclusion of another part; abstraction thus conceived being merely the negative of ATTENTION (q. v.). In this sense we are able in thought to abstract one object from another, or an attribute from an object, or an attribute perceived by one sense from those perceived by other senses. Even in cases when thoughts or images have become inseparably associated, we possess something of this power of abstracting or turning the attention upon one rather than another. Secondly, the word is used, with a more special signification, to describe that concentration of attention upon the resemblances of a number of objects, which constitutes classification. And thirdly, not to mention other less important changes of meaning, the whole process of generalisation, by which the mind forms the notions expressed by common terms, is frequently, through a curious transposition of names, spoken of as abstraction. Especially when understood in its less comprehensive connection, the process of abstraction possesses a peculiar interest. To the psychologist it is interesting, because there is nothing he is more desirous to understand than the mode of formation and true nature of what are called general notions. And fortunately, with regard to the abstractive process by which these are formed, at least in its initial stages, there is little disagreement; since every one describes it as a process of comparison, by which the mind is enabled to consider the objects confusedly pre-



sented to it in intuition, to recognise and attend exclusively to their points of agreement, and so to classify them in accordance with their perceived resemblances. Further, this process is admitted without much dispute to belong to the discursive or elaborative action of the intellect; although, perhaps—should the view of some modern psychologists be correct, that all intelligence proceeds by the establishment of relations of *likeness and unlikeness*—abstraction will be better conceived as thus related to intelligence in general and typical of all its processes, than as the action merely of a special and somewhat indefinite faculty. No such harmony, however, exists regarding the nature of the *product* of abstraction; for that is the subject-matter of Nominalism and Realism, which has produced more controversy, and stimulated to more subtlety of thought, than any other subject ever debated in philosophy. The concept or abstract idea has been represented in a multitude of ways: sometimes as an idea possessing an objective existence independent of particulars, even more real and permanent than theirs; sometimes as an idea composed of all the circumstances in which the particulars agree, and of no others; again, as the idea of an individual, retaining its individualising qualities, but with the accompanying knowledge that these are not the properties of the class; and yet again, as the idea of a miscellaneous assemblage of individuals belonging to a class. It is still impossible to say that the many-sided controversy is at an end. The only conclusion generally admitted seems to be, that there exists between the concept and the particular objects of intuition some very intimate relation of thought, so that it is necessary, for all purposes of reasoning, that the general and particular go hand in hand, that the idea of the class—if such exists—be capable of being applied, in every completed act of thought, to the objects comprised within the class.

To the student of ontology, also, abstraction is of special interest, since, according to many distinguished thinkers, the recognition of abstraction as a powerful and universal mental process is to explain all ontology away, and give the ontologist his eternal quietus. The thoroughgoing nominalist professes to discover in the mind an inveterate tendency to abstraction, and a proneness to ascribe separate existence to abstractions, amply sufficient to account for all those forms of independent reality which metaphysicians defend, and to exhibit them all in their true colours as fictitious assumptions. In reply, the ontologist, strengthened by the instinct of self-preservation, commonly contends that the analogy between general notions and metaphysical principles does not hold good, and that the latter are always more than simple abstractions or mere names. Only after abstraction is understood can the question be settled.

In like manner to logic, whether regarded as the science of the formal laws of thought, or, more widely, as the science of scientific methods, a true understanding of abstraction is of the greatest importance. It is important in pure logic, because, as we have seen, every act of judgment and reasoning postulates a concept or concepts, and so presupposes abstraction. Abstraction, determining the possibility alike of reason and speech, creates those notions that bear common names; it is indispensable to the formation of classes, great or small; and just according as it ascends, increasing the extension and diminishing the intension of classes, the horizon visible to reason and to logic gradually recedes and widens. And to logic as the science of the sciences a true doctrine of abstraction is not less necessary; because the process of extending knowledge is, in all its developments, essentially the same as the first rudimentary effort to form a concept and think of particulars as members of a class: a "natural law," at

least in its subjective aspect, is invariably an abstraction made by comparing phenomena—an abstraction under which phenomena are classed in order to the extension of knowledge just as under a concept are grouped the particulars presented in intuition. As proof of this identity it is found that the same differences exist regarding the objective or subjective nature of the "natural law" as regarding that of the concept. Some affirm that the law is brought ready-made by the mind and superinduced on the facts; others, that it is never in any sense more than a mere mental conception, got by observing the facts; while there are yet others who maintain it to be such a subjective conception, but one corresponding at the same time to an external relation which is real though unknowable.

ABSURDUM, REDUCTIO AD, a mode of demonstrating the truth of a proposition, by showing that its contradictory leads to an absurdity. It is much employed by Euclid.

ABU, a celebrated mountain of western India, between 5000 and 6000 feet in height, situated in 24° 40' N. lat., and 72° 48' E. long., within the Rājputānā State of Sirohi. It is celebrated as the site of the most ancient Jain temples in India, and attracts pilgrims from all parts of the country. The Jains are the modern Indian representatives of the Buddhists, and profess the ancient theistic doctrines of that sect, modified by saint worship and incarnations. The elevations and platforms of the mountain are covered with elaborately sculptured shrines, temples, and tombs. On the top of the hill is a small round platform containing a cavern, with a block of granite, bearing the impression of the feet of Dātā-Bhrigu, an incarnation of Vishnu. This is the chief great place of pilgrimage for the Jains, Shrawaks, and Banians. The two principal temples are situated at Deulwārā, about the middle of the mountain, and five miles south-west of Guru Sikrā, the highest summit. They are built of white marble, and are pre-eminent alike for their beauty and as typical specimens of Jain architecture in India. The following description is condensed from Mr Fergusson's *History of Architecture*, vol. ii. pp. 623 to 625:—The more modern of the two was built by two brothers, rich merchants, between the years 1197 and 1247, and for delicacy of carving and minute beauty of detail stands almost unrivalled, even in this land of patient and lavish labour. The other was built by another merchant prince, Bimalā Shāh, apparently about 1032 A.D., and although simpler and bolder in style, is as elaborate as good taste would allow in a purely architectural object. It is one of the oldest as well as one of the most complete examples of Jain architecture known. The principal object within the temple is a cell lighted only from the door, containing a cross-legged seated figure of the god Paresnāth. The portico is composed of forty-eight pillars, the whole enclosed in an oblong court-yard about 140 feet by 90 feet, surrounded by a double colonnade of smaller pillars, forming porticos to a range of fifty-five cells, which enclose it on all sides, exactly as they do in a Buddhist monastery (*vihāra*). In this temple, however, each cell, instead of being the residence of a monk, is occupied by an image of Paresnāth, and over the door, or on the jambs of each, are sculptured scenes from the life of the deity. The whole interior is magnificently ornamented. The Emperor Akbar, by a farmān dated in the month of Rabi-ul-āwāl, in the 37th year of his reign, corresponding with 1593, made a grant of the hill and temples of Abu, as well as of the other hills and places of Jain pilgrimage in the empire, to Harbijai Sur, a celebrated preceptor of the Setāmbari sect of the Jain religion. He also prohibited the slaughter of animals at these places. The farmān of this enlightened monarch declared that "it is the rule of the worshipper of God to preserve all religions."

ABU-BEKR (*father of the virgin*), was originally called Abd-el-Caaba (*servant of the temple*), and received the name by which he is known historically in consequence of the marriage of his virgin daughter Ayesha to Mohammed. He was born at Mecca in the year 573 A.D., a Koreishite of the tribe of Benn-Taim. Possessed of immense wealth, which he had himself acquired in commerce, and held in high esteem as a judge, an interpreter of dreams, and a depository of the traditions of his race, his early accession to Islamism was a fact of great importance. On his conversion he assumed the name of Abd-Alla (*servant of God*). His own belief in Mohammed and his doctrines was so thorough as to procure for him the title El Siddik (*the faithful*), and his success in gaining converts was correspondingly great. In his personal relationship to the prophet he showed the deepest veneration and most unswerving devotion. When Mohammed fled from Mecca, Abu-Bekr was his sole companion, and shared both his hardships and his triumphs, remaining constantly with him until the day of his death. During his last illness the prophet indicated Abu-Bekr as his successor, by desiring him to offer up prayer for the people. The choice was ratified by the chiefs of the army, and ultimately confirmed, though Ali, Mohammed's son-in-law, disputed it, asserting his own title to the dignity. After a time Ali submitted, but the difference of opinion as to his claims gave rise to a controversy which still divides the followers of the prophet into the rival factions of Sunnites and Shiites. Abu-Bekr had scarcely assumed his new position under the title Khalifet-Resul-Allah (*successor of the prophet of God*), when he was called to suppress the revolt of the tribes Hedjaz and Nedjd, of which the former rejected Islamism, and the latter refused to pay tribute. He encountered formidable opposition from different quarters, but in every case he was successful, the severest struggle being that with the impostor Mosallima, who was finally defeated by Khaled at the battle of Alraba. Abu-Bekr's zeal for the spread of the new faith was as conspicuous as that of its founder had been. When the internal disorders had been repressed and Arabia completely subdued, he directed his generals to foreign conquest. The Irak of Persia was overcome by Khaled in a single campaign, and there was also a successful expedition into Syria. After the hard-won victory over Mosallima, Omar, fearing that the sayings of the prophet would be entirely forgotten when those who had listened to them had all been removed by death, induced Abu-Bekr to see to their preservation in a written form. The record, when completed, was deposited with Hafsu, daughter of Omar, and one of the wives of Mohammed. It was held in great reverence by all Moslems, though it did not possess canonical authority, and furnished most of the materials out of which the Koran, as it now exists, was prepared. When the authoritative version was completed, all copies of Hafsu's record were destroyed, in order to prevent possible disputes and divisions. Abu-Bekr died on the 23d of August 634, having reigned as Khalif fully two years. Shortly before his death, which one tradition ascribes to poison, another to natural causes, he indicated Omar as his successor, after the manner Mohammed had observed in his own case.

ABULFARAGIUS, GREGOR ABULFARAJ (called also BARHEBRAS, from his Jewish parentage), was born at Malatia, in Armenia, in 1226. His father Aaron was a physician, and Abulfaragius, after studying under him, also practised medicine with great success. His command of the Arabic, Syriac, and Greek languages, and his knowledge of philosophy and theology, gained for him a very high reputation. In 1244 he removed to Antioch, and shortly after to Tripoli, where he was consecrated Bishop of Guba, when only twenty years of age. He was subse-

quently transferred to the see of Aleppo, and was elected in 1266 *Metropolitan* or Primate of the eastern section of the Jacobite Christians. This dignity he held till his death, which occurred at Maragha, in Azerbaijan, in 1286. Abulfaragius wrote a large number of works on various subjects, but his fame as an author rests chiefly on his *History of the World*, from the creation to his own day. It was written first in Syriac, and then, after a considerable interval, an abridged version in Arabic was published by the author at the request of friends. The latter is divided into ten sections, each of which contained the account of a separate dynasty. The historic value of the work lies entirely in the portions that treat of eastern nations, especially in those relating to the Saracens, the Tartar Mongols, and the conquests of Genghis Khan. The other sections are full of mistakes, arising partly no doubt from the author's comparative ignorance of classical languages. A Latin translation of the Arabic abridgement was published by Dr Pococke at Oxford in 1663. A portion of the original text, with Latin translation, edited, by no means carefully or accurately, by Bruns and F. W. Kirsch, appeared at Leipsic in 1788.

ABULFAZI, vizier and historiographer of the great Mongol emperor, Akbar, was born about the middle of the 16th century, the precise date being uncertain. His career as a minister of state, brilliant though it was, would probably have been by this time forgotten but for the record he himself has left of it in his celebrated history. The *Akbar Nameh*, or *Book of Akbar*, as Abulfazi's chief literary work is called, consists of two parts,—the first being a complete history of Akbar's reign, and the second, entitled *Ayin-i-Akbari*, or *Institutes of Akbar*, being an account of the religious and political constitution and administration of the empire. The style is singularly elegant, and the contents of the second part possess a unique and lasting interest. An excellent translation of that part by Mr Francis Gladwin was published in Calcutta, 1783-6. It was reprinted in London very inaccurately, and copies of the original edition are now exceedingly rare and correspondingly valuable. Abulfazi died by the hand of an assassin, while returning from a mission to the Deccan in 1602. Some writers say that the murderer was instigated by the heir-apparent, who had become jealous of the minister's influence.

ABULFEDA, ISMAEL BEN-ALI, EMAD-EDDIN, the celebrated Arabian historian and geographer, born at Damascus in the year 672 of the Hegira (1273 A.D.), was directly descended from Ayub, the father of the emperor Saladin. In his boyhood he devoted himself to the study of the Koran and the sciences, but from his twelfth year he was almost constantly engaged in military expeditions, chiefly against the crusaders. In 1285 he was present at the assault of a stronghold of the Knights of St John, and he took part in the sieges of Tripoli, Acre, and Roum. In 1298 the principedom of Hamah and other honours, originally conferred by Saladin upon Omar, passed by inheritance to Abulfeda; but the succession was violently disputed by his two brothers, and the Court availed itself of the opportunity to supersede all the three, and to abolish the principality. The sultan Melik-el-Nassir ultimately (1310) restored the dignity to Abulfeda, with additional honours, as an acknowledgment of his military services against the Tartars and Bibars, the sultan's rival. He received an independent sovereignty, with the right of coining money, &c., and had the title Melik Mowayyad (*victorious prince*) conferred upon him. For twenty years, till his death in October 1331, he reigned in tranquillity and splendour, devoting himself to the duties of government and to the composition of the works to which he is chiefly indebted for his fame. He was a munificent patron



of men of letters, who repaired in large numbers to his court. Abulfeda's chief historical work is *An Abridgement of the History of the Human Race*, in the form of annals, extending from the creation of the world to the year 1328. A great part of it is compiled from the works of previous writers, and it is difficult to determine accurately what is the author's and what is not. Up to the time of the birth of Mohammed, the narrative is very succinct; it becomes more full and valuable the nearer the historian approaches his own day. It is the only source of information on many facts connected with the Saracen empire, and altogether is by far the most important Arabian history we now possess. Various translations of parts of it exist, the earliest being a Latin rendering of the section relating to the Arabian conquests in Sicily, by Dobelius, Arabic professor at Palermo, in 1610. This is preserved in Muratori's *Rerum Italicarum Scriptores*, vol. i. The history from the time of Mohammed was published with a Latin translation by Reiske, under the title *Annales Moslemici* (5 vols., Copenhagen, 1789-94), and a similar edition of the earlier part was published by Fleischer at Leipzig in 1831, under the title *Abulfeda Historia Ant-Islamitica*. His *Geography* is chiefly valuable in the historical and descriptive parts relating to the Moslem empire. From his necessarily imperfect acquaintance with astronomy, his notation of latitude and longitude, though fuller than that of any geographer who preceded him, can in no case be depended on, and many of the places whose position he gives with the utmost apparent precision cannot be now identified. A complete edition was published by MM. Reinaud and De Slane at Paris in 1840; and Reinaud published a French translation, with notes and illustrations, in 1848. MSS. of both Abulfeda's great works are preserved in the Bodleian Library and in the National Library of France.

**ABULGHAZI-BAHADUR** (1605-1663), a Khan of Khiva, of the race of Genghis-Khan, who, after abdicating in favour of his son, employed his leisure in writing a history of the Mongols and Tartars. He produced a valuable work, which has been translated into German, French, and Russian.

**ABUNA**, the title given to the archbishop or metropolitan of Abyssinia.

**ABUSHEER**. See **BUSHIRE**.

**ABU-SIMBEL**, or **IPSAMUT**, the ancient *Aboccis* or *Abumcis*, a place in Nubia, on the left bank of the Nile,

about 50 miles S.W. of Derr, remarkable for its ancient Egyptian temples and colossal figures hewn out of the solid rock. For a description of these see **NUBIA**.

**ABU-TEMAN**, one of the most highly esteemed of Arabian poets, was born at Djacem in the year 190 of the Hegira (806 A.D.). In the little that is told of his life it is difficult to distinguish between truth and fable. He seems to have lived in Egypt in his youth, and to have been engaged in servile employment, but his rare poetic talent speedily raised him to a distinguished position at the court of the caliphs of Bagdad. Arabian historians assert that a single poem frequently gained for him many thousand pieces of gold, and the rate at which his contemporaries estimated his genius may be understood from the saying, that "no one could ever die whose name had been praised in the verses of Abu-Teman." Besides writing original poetry, he made three collections of select pieces from the poetry of the East, of the most important of which, called *Hamasa*, Sir William Jones speaks highly. Professor Carlyle quoted this collection largely in his *Specimens of Arabia Poetry* (1796). An edition of the text, with Latin translation, was published by Freytag at Bonn (1828-51), and a meritorious translation in German verse by Rückert appeared in 1846. Abu-Teman died 845 A.D.

**ABYDOS** (1.), in *Ancient Geography*, a city of Mysia in Asia Minor, situated on the Hellespont, which is here scarcely a mile broad. It probably was originally a Thracian town, but was afterwards colonised by Milesians. Nearly opposite, on the European side of the Hellespont, stood Sestos; and it was here that Xerxes crossed the strait on his celebrated bridge of boats when he invaded Greece. Abydos was celebrated for the vigorous resistance it made when besieged by Philip II. of Macedon; and is famed in story for the loves of Hero and Leander. The old castle of the Dardanelles, built by the Turks, lies a little southward of Sestos and Abydos.

**ABYDOS** (2.), in *Ancient Geography*, a town of Upper Egypt, a little to the west of the Nile, between Ptolemais and Diospolis Parva, famous for the palace of Memnon and the temple of Osiris. Remains of these two edifices are still in existence. In the temple of Osiris Mr Bankes discovered in 1818 the tablet of Abydos, containing a double series of twenty-six shields of the predecessors of Rameses the Great. This tablet is now deposited in the British Museum.

## ABYSSINIA

**ABYSSINIA** is an extensive country of Eastern Africa, the limits of which are not well defined, and authorities are by no means agreed respecting them. It may, however, be regarded as lying between 7° 30' and 15° 40' N. lat., and 35° and 40° 30' E. long., having, N. and N.W., Nubia; E., the territory of the Danakils; S., the country of the Gallas; and W., the regions of the Upper Nile.<sup>1</sup> It has an area of

about 200,000 square miles, and a population of from 3,000,000 to 4,000,000.

The name Abyssinia, or more properly Habessinia, is derived from the Arabic word *Habesch*, which signifies mixture or confusion, and was applied to this country by the Arabs on account of the mixed character of the people. This was subsequently Latinised by the Portuguese into *Abassia* and *Abassinis*, and hence the present name. The Abyssinians call themselves *Itiopyavan*, and their country *Itiopia*, or *Manghesta Itiopia*, the kingdom of Ethiopia.

<sup>1</sup> It is usual to include in Abyssinia the flat country which lies between it and the Red Sea, and to regard the latter as forming its boundary on the east. This, however, is not strictly correct. Abyssinia proper comprises only the mountainous portion of this territory, the low lying portion being inhabited by distinct and hostile tribes, and claimed by the Viceroy of Egypt as part of his dominions. The low country is very unhealthy, the soil dry and arid, and with few exceptions uncultivated, whereas the highlands are generally salubrious, well watered, and in many parts very fertile. This arid track of country is only a few miles broad at Massowah, in the north, but widens out to 200 or 300 miles at Tajurah, in the south. It is, in a great measure, owing to Abyssinia being thus cut off from intercourse with the civilised world by this inhospitable region, which has for three centuries been in the hands of enemies, that it is at present so far sunk in ignorance and barbarism.

The country of Abyssinia rises rather abruptly from the low arid district on the borders of the Red Sea in lofty ranges of mountains, and slopes away more gradually to the westward, where the tributaries of the Nile have formed numerous deep valleys. It consists for the most part of extensive and elevated table-lands, with mountain ranges extending in different directions, and intersected by numerous valleys. The table-lands are generally from 6000 to 9000 feet above the level of the sea, but in the south there are

some of considerable extent, which attain a height of more than 10,000 feet. The mountains in various parts of the country rise to 12,000 and 13,000 feet above the sea, and some of the peaks of Samen are said to reach to 15,000 feet, and to be always covered with snow. The average height of the range which divides the streams flowing to the east from those that flow westward is about 8000 feet, rising to 10,000 or 11,000 in the south, and sinking in the north. The whole country presents the appearance of having been broken up and tossed about in a remarkable manner, the mountains assuming wild and fantastic forms, with sides frequently abrupt and precipitous, and only accessible by very difficult passes. The Samen range of mountains are the highest in Abyssinia, and together with the Lamalmon and Lasta mountains form a long but not continuous chain, running from north to south.



Sketch Chart of Abyssinia.

The principal rivers of Abyssinia are tributaries of the Nile. The western portion of the country may be divided into three regions, drained respectively by the Mareb, the Atbara, and the Abai. The most northern of these rivers is the Mareb, which rises in the mountains of Taranta, flows first south, then west, and afterwards turns to the north, where it is at length, after a course of upwards of 500 miles, lost in the sand, but in the rainy season it falls into the Atbara. The Atbara, or Takazza, rises in the mountains of Lasta, and flowing first north, then west, and again turning to the north, at length falls into the Nile, after a course of about 800 miles. The Abai, Bahr-el-Azrek or Blue River, the eastern branch of the Nile, and considered by Bruce to be the main stream of that river, rises from two mountains near Geesh, in lat.  $10^{\circ} 59' 25''$  N., long.  $36^{\circ} 55' 30''$  E., about 10,000 feet above the level of the sea. It flows first north to the Lake of Dembea or Tzana, then takes a long semicircular sweep round the province of Godjam, and afterwards flows northward to about the 15th degree of N. lat., where it unites with the Bahr-el-Abiad, which has now been ascertained to be the true Nile. The Hawash, the principal river of eastern Abyssinia, rises about lat.  $9^{\circ} 30'$  N., long.  $38^{\circ}$  E., and, flowing in a north-easterly direction towards the Red Sea, is lost in Lake Aussa, lat.

$11^{\circ} 25'$  N., long.  $41^{\circ} 40'$  E. The principal lake of Abyssinia is the Dembea, which lies between  $11^{\circ} 30'$  and  $12^{\circ} 30'$  N. lat., and  $37^{\circ}$  and  $37^{\circ} 35'$  E. long., being about 60 miles in length by 40 in width, and containing a number of small islands. It is fed by numerous small streams. The lake of Ashangi, in lat.  $12^{\circ} 35'$  N., long.  $39^{\circ} 40'$  E., is about 4 miles long by 3 broad, and upwards of 8000 feet above the sea.

The fundamental rocks of Tigré, and probably of all Abyssinia, are metamorphic. They compose the mass of the table-land, and while they occupy no inconsiderable portion of its surface, they are exposed, in Tigré at least, in every deep valley. The metamorphics vary greatly in mineral character, "every intermediate grade being found between the most coarsely crystalline granite and a slaty rock so little altered that the lines of the original bedding are still apparent. Perhaps the most prevalent form of rock is a rather finely crystalline gneiss. Hornblende-schist and mica-schist are met with, but neither of the minerals from which they are named appears to be so abundant as in some metamorphic tracts. On the other hand, a compact felspathic rock, approaching felsite in composition, is prevalent in places, as in the Suru defile, between Komayli and Senafé." There are a few exceptions, but as a general rule it may be asserted that in the neighbourhood of the route followed by the British army, so much of the country as is more than 8000 feet above the sea consists of bedded traps, and this is probably the case in general over Abyssinia. "Between the traps and the metamorphics a series of sandstones and limestones intervene, one group of the former underlying the latter. The limestone alone is fossiliferous, and is of Jurassic age." "On the route to Magdala volcanic rocks were first met with at Senafé, where several hills consist of trachyte, passing into claystone and basalt. Trap hills, chiefly of trachyte, are dotted over the country to the southward as far as Fokada, a distance of nearly 30 miles. Here a great range of bedded traps commences, and extends for about 25 miles to the south, passing to the west of Adigerat." At Meshek, two marches south of Antaló, "the route entered high ranges entirely composed of trap, and thence no other rocks were seen as far as Magdala." "The trappean rocks belong to two distinct and unconformable groups. The lower of these is much inclined, while the higher rests on its upturned and denuded edges." Denudation has evidently been going on to a great extent in this country. One of its most striking features are the deep ravines which have been worked out by the action of the streams, sometimes to the depth of 3000 or 4000 feet. "How much of the Abyssinian highlands has been removed by these great torrents, and spread as an alluvial deposit over the basin of the Nile?" "Probably over the whole of northern Abyssinia there existed at least 4000 feet of bedded traps, of which now only a few vestiges remain."—W. T. Blanford.

Abyssinia is said to enjoy "probably as salubrious a climate as any country on the face of the globe."—Parkyns. The heat is by no means oppressive, a fine light air counteracting the power of the sun; and during the rainy season, the sky being cloudy, the weather is always agreeable and cool, while the rain itself is not very severe. In certain of the low valleys, however, malarious influences prevail before and after the rainy season, and bring on dangerous fevers. On the higher parts the cold is sometimes intense, particularly at night. The natural division of the seasons is into a cold, a hot, and a rainy season. The cold season may be said to extend from October to February, the hot from the beginning of March to the middle of June, and the wet or monsoon period from this time to the end of September. The rainy season is of importance, not only in equalising the temperature, increasing



the fertility, and keeping up the water supply of the country, but, as Sir S. Baker has shown, it plays a most important part in the annual overflow of the Nile.

On the summits and slopes of the highest mountains the vegetation is of a thoroughly temperate and even English character; the plateaux have a flora of the same character; while on the lower slopes of the hills and in the ravines occur many trees and shrubs of warmer climes. "The general appearance of the plateaux and plains is that of a comparatively bare country, with trees and bushes thinly scattered over it, and clumps and groves only occurring round villages and churches. But the glens and ravines in the plateau sides, each with its little bright spring, are often thickly wooded, and offer a delicious contrast to the open country."—*Markham*. This refers more particularly to the northern portion of the country, that drained by the Mareb; the central and southern parts are much more fertile and productive. Here the fertility is so great that in some parts three crops are raised annually. Agriculture receives considerable attention, and large quantities of maize, wheat, barley, peas, beans, &c., are grown. Very extensively cultivated is *teff* (*Poa abyssinica*), a herbaceous plant with grains not larger than the head of a pin, of which is made the bread in general use throughout the country. The low grounds produce also a kind of corn called *tocussa*, of which a black bread is made, which constitutes the food of the lower classes. Coffee grows wild on the western mountains, and the vine and sugar-cane are cultivated in favourable localities. Cotton is also grown to a considerable extent. Among the fruit-trees are the date, orange, lemon, pomegranate, and banana. Myrrh, balsam, and various kinds of valuable medicinal plants are common.

Most of the domestic animals of Europe are found here. The cattle are in general small, and the oxen belong to the humped race. The famous Galla oxen have horns sometimes four feet long. The sheep belong to the short and fat-tailed race, and are covered with wool. Goats are very common, and have sometimes horns two feet in length. The horses are strong and active. Of wild animals the spotted hyæna is among the most numerous, as well as the fiercest and most destructive, not only roaming in immense numbers over the country, but frequently entering the towns, and even the houses of the inhabitants. The elephant and rhinoceros are numerous in the low grounds. The Abyssinian rhinoceros has two horns; its skin, which has no folds, is used for shields, and for lining drinking vessels, being regarded as an antidote to poison. Crocodiles and hippopotami are plentiful in the rivers; lions, panthers, and leopards are seen occasionally, and buffaloes frequently. Among other animals may be mentioned as common various species of antelopes, wild swine, monkeys, hares, squirrels, several species of hyrax, jackals, &c.

The birds of Abyssinia are very numerous, and many of them remarkable for the beauty of their plumage. Great numbers of eagles, vultures, hawks, and other birds of prey are met with; and partridges, snipes, pigeons, parrots, thrushes, and swallows are very plentiful. Among insects the most numerous and useful is the bee, honey everywhere constituting an important part of the food of the inhabitants, and several of the provinces paying a large proportion of their tribute in this article. Of an opposite class is the locust, the ravages of which here, as in other parts of Northern Africa, are terrible. Serpents are not numerous, but several species are poisonous.

The inhabitants of Abyssinia form a number of different tribes, and evidently belong to several distinct races. The majority are of the Caucasian race, and are in general well-formed and handsome, with straight and regular features, lively eyes, hair long and straight or somewhat curled, and colour dark olive, approaching to black. Rüppell regards

them as identical in features with the Bedouin Arabs. The tribes inhabiting Tigré, Amhara, Agow, &c., belong to this race. The Galla race, who came originally from the south, have now overrun the greater part of the country, constituting a large portion of the soldiery, and, indeed, there are few of the chiefs who have not an intermixture of Galla blood in their veins. They are fierce and turbulent in character, and addicted to cruelty. Many of them are still idolaters, but most of them have now adopted the Mohammedan faith, and not a few of them the Christianity of the Abyssinians. They are generally large and well-built, of a brown complexion, with regular features, small deeply-sunk but very bright eyes, and long black hair. A race of Jews, known by the name of Falashas, inhabit the district of Samen. They affirm that their forefathers came into the country in the days of Rehoboam, but it seems more probable that they arrived about the time of the destruction of Jerusalem. From the 10th century they enjoyed their own constitutional rights, and were subject to their own kings, who, they pretend, were descended from King David, until the year 1800, when the royal race became extinct, and they then became subject to Tigré.

The prevailing religion of Abyssinia is a very corrupted form of Christianity. This is professed by the majority of the people, as well as by the reigning princes of the different states. There are also scattered over the country many Mohammedans, and some Falashas or Jews. Christianity was introduced into this country about the year 330, but since that time it has been so corrupted by errors of various kinds as to have become little more than a dead formality mixed up with much superstition and Judaism. Feasts and fast-days are very frequent, and baptism and the Lord's supper are dispensed after the manner of the Greek Church. The children are circumcised, and the Mosaic commandments with respect to food and purification are observed. The eating of animals which do not chew the cud and which have not cloven hoofs is prohibited. The ecclesiastical body is very numerous, consisting of priests, of various kinds, with monks and nuns, and is looked upon with great awe and reverence. If a priest be married previous to his ordination, he is allowed to remain so; but no one can marry after having entered the priesthood. The primate or chief bishop is called *Abuna* (i.e., our father), and is nominated by the patriarch of Cairo, whom they acknowledge as their spiritual father. The churches are rude edifices, chiefly of a circular form, with thatched roofs, the interior being divided into three compartments,—an outer one for the laity, one within for the priests, and in the centre the Holy of Holies, exactly after the manner of a Jewish temple. The worship consists merely in reading passages of Scripture and dispensing the Lord's supper, without any preaching. Like the Greek Church, they have no images of any kind in their places of worship, but paintings of the saints are very common—their faces always in full, whatever may be the position of their bodies. They have innumerable saints, but above all is the Virgin, whom they regard as queen of heaven and earth, and the great intercessor for the sins of mankind. Their reverence for a saint is often greater than for the Almighty, and a man who would not hesitate to invoke the name of his Maker in witness to a falsehood may decline so to use the name of St Michael or St George. Legends of saints and works of religious controversy form almost their entire literature. "At present," says Bishop Gobat, "the Christians of Abyssinia are divided into three parties, so inimical to each other that they curse one another, and will no longer partake of the sacrament together. It is one single point of theology that disunites them—the unceasing dispute concerning the unction of Jesus Christ."

In manners the Abyssinians are rude and barbarous.

Engaged as they are in continual wars, and accustomed to bloodshed, human life is little regarded among them. Murders and executions are frequent, and yet cruelty is said not to be a marked feature of their character; and in war they seldom kill their prisoners. When one is convicted of murder, he is handed over to the relatives of the deceased, who may either put him to death or accept a ransom. When the murdered person has no relatives, the priests take upon themselves the office of avengers. The Abyssinians are irritable, but easily appeased; and are a gay people, fond of festive indulgences. On every festive occasion, as a saint's day, birth, marriage, &c., it is customary for a rich man to collect his friends and neighbours, and kill a cow and one or two sheep. The principal parts of the cow are eaten raw while yet warm and quivering, the remainder being cut into small pieces, and cooked with the favourite sauce of butter and red pepper paste. The raw meat in this way is considered to be very superior in taste and much tenderer than when cold. "I can readily believe," says Mr Parkyns, "that raw meat would be preferred to cooked meat by a man who from childhood had been accustomed to it." The statement by Bruce respecting the cutting of steaks from a live cow has frequently been called in question, but there can be no doubt that Bruce actually saw what he narrates, though it would appear to have been a very exceptional case. Mr Parkyns was told by a soldier, "that such a practice was not uncommon among the Gallas, and even occasionally occurred among themselves, when, as in the case Bruce relates, a cow had been stolen or taken in foray." The principal drinks are *nése*, a kind of mead, and *bousa*, a sort of beer made from fermented cakes. Their dress consists of a large folding mantle and close-fitting drawers; and their houses are very rude structures of a conical form, covered with thatch. Marriage is a very slight connection among them, dissolvable at any time by either of the parties; and polygamy is by no means uncommon. Hence there is little family affection, and what exists is only among children of the same father and mother. Children of the same father, but of different mothers, are said to be "always enemies to each other."—*Gobat*.

Abyssinia is one of the most ancient monarchies in the world, and has been governed from time immemorial by an emperor. For many years, however, until the accession of the late Emperor Theodore, he had been a mere puppet in the hands of one or other of his chiefs. Each chief is entire master of all sources of revenue within his territory, and has practically full power of life and death. His subjection consists in an obligation to send from time to time presents to his superior, and to follow him to war with as large a force as he can muster. For several generations the emperor had been little better than a prisoner in his palace at Gondar, his sole revenue consisting of a small stipend and the tolls of the weekly markets of that city, the real power being in the hands of the *ras* or vizier of the empire, who was always the most powerful chief for the time. If at any time a chief "has found himself strong enough to march upon the capital, he has done so, placed upon the throne another puppet emperor, and been by him appointed *ras* or vizier, till a rival stronger than himself could turn him out and take his place."—*Dr Beka*.

The three principal provinces of Abyssinia are Tigré in the north, Amhara (in which Gondar the capital is situated) in the centre, and Shoa in the south. The governors of these have all at different times assumed the title of *Ras*. Three other provinces of some importance are Lasta and Waag, whose capital is Sokota; Godjam, to the south of Lake Dembea; and Kivara, to the west of that lake, the birth-place of the Emperor Theodore. The two provinces of Tigré and Shoa have generally been in a state of rebellion

from or acknowledged independence of the central power at Gondar. The geographical position of Tigré enhances its political importance, as it lies between Gondar and the sea at Massowah, and thus holds as it were the gate of the capital. The province of Shoa is almost separated from that of Amhara by the Wolla Gallas, a Mohammedan tribe, and for a long time the former had been virtually independent, and governed by a hereditary line of princes, to one of whom the Indian government sent a special embassy under Major Harris in 1841.

The principal towns are Gondar in Amhara, the former capital of the kingdom, and containing about 7000 inhabitants, and Debra Tabor in Amhara, formerly a small village, but which rose to be a place of considerable size in consequence of the Emperor Theodore having fixed upon it as his residence, and near it was Gaffat, where the European workmen resided. It was burned by the emperor when he set out on his fatal march to Magdala. Adowa is the capital of Tigré, and the second city in the empire, having about 6000 inhabitants. Antalo is also one of the principal towns of Tigré, and the capital of Enderta. Near Antalo is Chelicut. Sokota, the capital of Lasta Waag, is a town of considerable size. The capital of Shoa is Ankobar, and near it is Angolala, also a place of considerable size. The capital of Agamé is Adigerat.

The language of the religion and literature of the country is the Geez, which belongs to the Ethiopic class of languages, and is the ancient language of Tigré; of this the modern Tigré is a dialect. The Amharic, the language of Amhara, is that of the court, the army, and the merchants, and is that too which travellers who penetrate beyond Tigré have ordinarily occasion to use. But the Agow in its various dialects is the language of the people in some provinces almost exclusively, and in others, where it has been superseded by the language of the dominant race, it still exists among the lowest classes. This last is believed to be the original language of the people; and from the affinity of the Geez, Amharic, and cognate dialects, to the Arabic, it seems probable that they were introduced by conquerors or settlers from the opposite shores of the Red Sea. The Gallas, who have overrun a great part of Abyssinia, have introduced their own language into various parts of the country, but in many cases they have adopted the language of the people among whom they have come. The literature of Abyssinia is very poor, and contains nothing of much value. During the late war the libraries in connection with the religious communities were found to contain only modern works of little interest. On the capture of Magdala, a large number of MSS. were found there, which had been brought by Theodore from Gondar and other parts. Of these 359 were brought home for examination, and are now deposited in the British Museum. The oldest among them belong to the 15th and 16th centuries, but the great bulk of them are of the 17th and 18th, and some are of the present century. They are mostly copies of the Holy Scriptures, canonical and apocryphal, including the Book of Enoch, prayer and hymn books, missals, lives of saints, and translations of various of the Greek fathers.

The trade and manufactures of Abyssinia are insignificant, the people being chiefly engaged in agriculture and pastoral pursuits. Cotton cloths, the universal dress of the country, are made in large quantities. The preparation of leather and parchment is also carried on to some extent, and manufactures of iron and brass. "The Abyssinians are, I think," says Mr Markham, "capable of civilisation. Their agriculture is good, their manufactures are not to be despised; but the combined effects of isolation, Galla invasions, and internal anarchy, have thrown them back for centuries." The foreign trade of Abyssinia is carried on entirely through Massowah. Its principal imports are lead.



tin, copper, silk, gunpowder, glass wares, Persian carpets, and coloured cloths. The chief exports are gold, ivory, slaves, coffee, butter, honey, and wax.

Abyssinia, or at least the northern portion of it, was included in the ancient kingdom of Ethiopia. The connection between Egypt and Ethiopia was in early times very intimate, and occasionally the two countries were under the same ruler, so that the arts and civilisation of the one naturally found their way into the other. In early times, too, the Hebrews had commercial intercourse with the Ethiopians; and according to the Abyssinians, the Queen of Sheba, who visited Solomon, was a monarch of their country, and from her son Menilek the kings of Abyssinia are descended. During the captivity many of the Jews settled here, and brought with them a knowledge of the Jewish religion. Under the Ptolemies, the arts as well as the enterprise of the Greeks entered Ethiopia, and led to the establishment of Greek colonies. A Greek inscription at Adulis, no longer extant, but copied by Cosmos, and preserved in his *Topographia Christiana*, records that Ptolemy Euergetes, the third of the Greek dynasty in Egypt, invaded the countries on both sides of the Red Sea, and, having reduced most of the provinces of Tigré to subjection, returned to the port of Adulis, and there offered sacrifices to Jupiter, Mars, and Neptune. Another inscription, not so ancient, found at Axum, and copied by Salt and others, states that Aëizanas, king of the Axomites, the Homerites, &c., conquered the nation of the Bogos, and returned thanks to his father, the god Mars, for his victory. The ancient kingdom of Auxume flourished in the first or second century of our era, and was at one time nearly coextensive with the modern Abyssinia. The capital Auxume and the seaport Adulis were then the chief centres of the trade with the interior of Africa in gold dust, ivory, leather, aromatics, &c. At Axum, the site of the ancient capital, many vestiges of its former greatness still exist; and the ruins of Adulis, which was once a seaport on the Bay of Annesley, are now about 4 miles from the shore. Christianity was introduced into the country by Frumentius, who was consecrated first bishop of Abyssinia by St Athanasius of Alexandria about A.D. 330. Subsequently the monastic system was introduced, and between 470 and 480 a great company of monks appear to have entered and established themselves in the country. Since that time Monachism has been a power among the people, and not without its influence on the course of events. In 522 the king of the Homerites, on the opposite coast of the Red Sea, having persecuted the Christians, the Emperor Justinian requested the king of Abyssinia, Caleb or Elesbaan, to avenge their cause. He accordingly collected an army, crossed over into Arabia, and conquered Yemen, which remained subject to Abyssinia for 67 years. This was the most flourishing period in the annals of the country. The Ethiopians possessed the richest part of Arabia, carried on a large trade, which extended as far as India and Ceylon, and were in constant communication with the Greek empire. Their expulsion from Arabia, followed by the conquest of Egypt by the Mohammedans in the middle of the 7th century, changed this state of affairs, and the continued advances of the followers of the Prophet at length cut them off from almost every means of communication with the civilised world; so that, as Gibbon says, "encompassed by the enemies of their religion, the Ethiopians slept for near a thousand years, forgetful of the world by whom they were forgotten." About A.D. 960, a Jewish princess, Judith, conceived the bloody design of murdering all the members of the royal family, and of establishing herself in their stead. During the execution of this project, the infant king was carried off by some faithful adherents, and conveyed to Shoa, where his authority was acknowledged, while Judith reigned

for 40 years over the rest of the kingdom, and transmitted the crown to her descendants. In 1268 the kingdom was restored to the royal house in the person of Icon Imlac.

Towards the close of the 15th century the Portuguese missions into Abyssinia commenced. A belief had long prevailed in Europe of the existence of a Christian kingdom in the far east, whose monarch was known as Prester John, and various expeditions had been sent in quest of it. Among others who had engaged in this search was Pedro de Covilham, who arrived in Abyssinia in 1490, and, believing that he had at length reached the far-famed kingdom, presented to the Negus, or emperor of the country, a letter from his master the king of Portugal, addressed to Prester John. Covilham remained in the country, but in 1507 an Armenian named Matthew was sent by the Negus to the king of Portugal to request his aid against the Turks. In 1520 a Portuguese fleet, with Matthew on board, entered the Red Sea in compliance with this request, and an embassy from the fleet visited the country of the Negus, and remained there for about six years. One of this embassy was Father Alvarez, from whom we have the earliest and not the least interesting account of the country. Between 1528 and 1540 armies of Mohammedans, under the renowned general Mohammed Gragn, entered Abyssinia from the low country, and overran the kingdom, obliging the emperor to take refuge in the mountain fastnesses. In this extremity recourse was again had to the Portuguese, and Bermudez, who had remained in the country after the departure of the embassy, was ordained successor to the Abuna, and sent on this mission. In consequence a Portuguese fleet, under the command of Stephen de Gama, was sent from India and arrived at Massowah. A force of 450 musqueteers, under the command of Christopher de Gama, younger brother of the admiral, marched into the interior, and being joined by native troops were at first successful against the Turks, but were subsequently defeated, and their commander taken prisoner and put to death. Soon afterwards, however, Mohammed Gragn was shot in an engagement, and his forces totally routed. After this, quarrels arose between the Negus and the Catholic primate Bermudez, who wished the former publicly to profess himself a convert to Rome. This the Negus refused to do, and at length Bermudez was obliged to make his way out of the country. The Jesuits who had accompanied or followed Bermudez into Abyssinia, and fixed their head-quarters at Fremona, were oppressed and neglected, but not actually expelled. In the beginning of the following century Father Paez arrived at Fremona, a man of great tact and judgment, who soon rose into high favour at court, and gained over the emperor to his faith. He directed the erection of churches, palaces, and bridges in different parts of the country, and carried out many useful works. His successor Mendez was a man of much less conciliatory manners, and the feelings of the people became more strongly excited against the intruders, till at length, on the death of the Negus, and the accession of his son Facilidas in 1633, they were all sent out of the country, after having had a footing there for nearly a century and a half. The French physician Poncet, who went there in 1698, was the only European that afterwards visited the country before Bruce in 1769.

It was about the middle of the 16th century that the Galla tribes first entered Abyssinia from the south; and notwithstanding frequent efforts to dislodge them, they gradually extended and strengthened their positions till they had overrun the greater part of the country. The power of the emperor was thus weakened, independent chiefs set themselves up in different parts, until at length he became little better than a puppet in the hands of the most powerful of his chiefs. In 1805 the country was visited by Lord Valentia and Mr Salt, and again by Salt in 1810. In

1829 Messrs Gobat and Kugler were sent out as missionaries by the Church Missionary Society, and were well received by the Ras of Tigré. Mr Kugler died soon after his arrival, and his place was subsequently supplied by Mr Isenberg, who was followed by Messrs Blumhardt and Krapf. In 1830 Mr Gobat proceeded to Gondar, where he also met with a favourable reception. In 1833 he returned to Europe, and published a journal of his residence here. In the following year he went back to Tigré, but in 1836 he was compelled to leave from ill health. In 1838 other missionaries were obliged to leave the country, owing to the opposition of the native priests. Messrs Isenberg and Krapf went south, and established themselves at Shoa. The former soon after returned to England, and Mr Krapf remained in Shoa till March 1842. Dr Rüppel, the German naturalist, visited the country in 1831, and remained nearly two years. MM. Combes and Tamisier arrived at Massowah in 1835, and visited districts which had not been traversed by Europeans since the time of the Portuguese. In 1839 the French Government sent out a scientific commission under M. Lefebvre. Its labours extended over five years, and have thrown great light on the condition and productions of the country. In 1841 a political mission was sent by the Governor-General of India to Shoa, under the direction of Major Harris, who subsequently published an account of his travels. One who has done much to extend our geographical knowledge of this country is Dr Beke, who was there from 1840 to 1843. Mr Mansfield Parkyns was there from 1843 to 1846, and has written the most interesting book on the country since the time of Bruce. Bishop Gobat having conceived the idea of sending lay missionaries into the country, who would engage in secular occupations as well as carry on missionary work, Dr Krapf and Mr Flad arrived in 1855 as pioneers of that mission. Six came out at first, and they were subsequently joined by others. Their work, however, was more valuable to Theodore than their preaching, so that he employed them as workmen to himself, and established them at Gaffat, near his capital. Mr Stern arrived in Abyssinia in 1860, but returned to Europe, and came back in 1863, accompanied by Mr and Mrs Rosenthal.

Lij Kassa, who came subsequently to be known as the Emperor Theodore, was born in Kuara, a western province of Abyssinia, about the year 1818. His father was of noble family, and his uncle was governor of the provinces of Dombou, Kuara, and Chelga. He was educated in a convent, but, preferring a wandering life, he became leader of a band of malcontents. On the death of his uncle he was made governor of Kuara, but, not satisfied with this, he seized upon Demebe, and having defeated several generals sent against him, peace was restored on his receiving Tavavitch, daughter of Ras Ali, in marriage. This lady is said to have been his good genius and counsellor, and during her life his conduct was most exemplary. He next turned his arms against the Turks, but was defeated; and the mother of Ras Ali having insulted him in his fallen condition, he proclaimed his independence. The troops sent against him were successively defeated, and eventually the whole of the possessions of Ras Ali fell into his hands. He next defeated the chief of Godjam, and then turned his arms against the governor of Tigré, whom he totally defeated in February 1855. In March of the same year he took the title of Theodore III., and caused himself to be crowned king of Ethiopia by the Abuna. Theodore was now in the zenith of his career. He is described as being generous to excess, free from cupidity, merciful to his vanquished enemies, and strictly continent, but subject to violent bursts of anger, and possessed of unyielding pride and fanatical religious zeal. He was also a man of education and intelligence, superior to those among whom he lived, with natural

talents for governing, and gaining the esteem of others. He had further a noble bearing and majestic walk, a frame capable of enduring any amount of fatigue, and is said to have been "the best shot, the best spearman, the best runner, and the best horseman in Abyssinia." Had he contented himself with what he now possessed, the sovereignty of Amhara and Tigré, he might have maintained his position; but he was led to exhaust his strength against the Gallas, which was probably one of the chief causes of his ruin. He obtained several victories over that people, ravaged their country, took possession of Magdala, which he afterwards made his principal stronghold, and enlisted many of the chiefs and their followers in his own ranks. He shortly afterwards reduced the kingdom of Shoa, and took Ankobar, the capital; but in the meantime his own people were groaning under his heavy exactions, rebellions were breaking out in various parts of his provinces, and his good queen was now dead. He lavished vast sums of money upon his army, which at one time amounted to 100,000 or 150,000 fighting men; and in order to meet this expenditure, he was forced to exact exorbitant tributes from his people. The British consul, Plowden, who was strongly attached to Theodore, having been ordered by his Government in 1860 to return to Massowah, was attacked on his way by a rebel named Garred, mortally wounded, and taken prisoner. Theodore attacked the rebels, and in the action the murderer of Mr Plowden was slain by his friend and companion Mr Bell, but the latter lost his life in preserving that of Theodore. The deaths of the two Englishmen were terribly avenged by the slaughter or mutilation of nearly 2000 rebels. Theodore soon after married his second wife Terunish, the proud daughter of the late governor of Tigré, who felt neither affection nor respect for the upstart who had dethroned her father, and the union was by no means a happy one. In 1862 he made a second expedition against the Gallas, which was stained with atrocious cruelties. Theodore had now given himself up to intoxication and lust. When the news of Mr Plowden's death reached England, Captain Cameron was appointed to succeed him as consul, and arrived at Massowah in February 1862. He proceeded to the camp of the king, to whom he presented a rifle, a pair of pistols, and a letter in the Queen's name. In October Captain Cameron was dismissed by Theodore, with a letter to the Queen of England which reached the Foreign Office on the 12th of February 1863. For some reason or other this letter was put aside and no answer returned, and to this in no small degree is to be attributed the difficulties that subsequently arose with that country. After forwarding the letter, Captain Cameron, hearing that the Christians of Bogos had been attacked by the Shangallas and other tribes under Egyptian rule, proceeded to that district, and afterwards went to Kassala, the seat of the Egyptian administration in that quarter. Thence he went to Metemeh, where he was taken ill, and in order to recruit his health he returned to Abyssinia, and reached Jenda in August 1863. In November despatches were received from England, but no answer to the emperor's letter, and this, together with the consul's visit to Kassala, greatly offended him, and in January 1864 Captain Cameron and his suite, with Messrs Stern and Rosenthal, were cast into prison. When the news of this reached England, the Government resolved, when too late, to send an answer to the emperor's letter, and selected Mr Hormuzd Rassam to be its bearer. He arrived at Massowah in July 1864, and immediately despatched a messenger requesting permission to present himself before the emperor. Neither to this nor a subsequent application was any answer returned till August 1865, when a curt note was received, stating that Consul Cameron had been released, and if Mr Kassam still



desired to visit the king, he was to proceed by the route of Metemeh. They reached Metemeh on 21st November, and five weeks more were lost before they heard from the emperor, whose reply was now courteous, informing them that the governors of all the districts through which they had to march had received orders to furnish them with every necessary. They left Metemeh on the 28th December, and on 25th January following arrived at Theodore's camp in Damot. They were received with all honour, and were afterwards sent to Kuarata, on Lake Dembea, there to await the arrival of the captives. The latter reached this on 12th March, and everything appeared to proceed very favourably. A month later they started for the coast, but had not proceeded far when they were all brought back and put into confinement. Theodore then wrote a letter to the Queen, requesting European workmen and machinery to be sent to him, and despatched it by Mr Flad. The Europeans, although detained as prisoners, were not at first unkindly treated; but in the end of June they were sent to Magdala, where they were soon afterwards put in chains. They suffered hunger, cold, and misery, and were in constant fear of death, till the spring of 1868, when they were relieved by the British troops. In the meantime the power of Theodore in the country was rapidly waning. In order to support his vast standing army, the country was drained of its resources: the peasantry abandoned the fertile plains, and took refuge in the fastnesses, and large fertile tracts remained uncultivated. Rebellions broke out in various parts of the country, and desertions took place among his troops, till his army became little more than a shadow of what it once was. Shoa had already shaken off his yoke; Godjam was virtually independent; Walkeit and Samen were under a rebel chief; and Lasta Waag and the country about Lake Ashangi had submitted to Wagsham Gobaze, who had also overrun Tigré, and appointed Dejach Kassai his governor. The latter, however, in 1867 rebelled against his master, and assumed the supreme power of that province. This was the state of matters when the English troops made their appearance in the country. With a view if possible to effect the release of the prisoners by conciliatory measures, Mr Flad was sent back, with some artisans and machinery, and a letter from the Queen, stating that these would be handed over to his Majesty on the release of the prisoners and their return to Massowah. This, however, failed to influence the emperor, and the English Government at length saw that they must have recourse to arms. In July 1867, therefore, it was resolved to send an army into Abyssinia to enforce the release of the captives, and Sir Robert Napier was appointed commander-in-chief. A reconnoitring party was despatched beforehand, under Colonel Merewether, to select the landing-place and anchorage, and explore the passes leading into the interior. They also entered into friendly relations with the different chiefs in order to secure their co-operation. The landing-place selected was Mulkuto, on Annesley Bay, the point of the coast nearest to the site of the ancient Adulis, and we are told that "the pioneers of the English expedition followed to some extent in the footsteps of the adventurous soldiers of Ptolemy, and met with a few faint traces of this old world enterprise."—*C. R. Markham*. The force amounted to upwards of 16,000 men, besides 12,640 belonging to the transport service, and followers, making in all upwards of 32,000 men. The task to be accomplished was to march over 400 miles of a mountainous and little-known country, inhabited by savage tribes, to the camp or fortress of Theodore, and compel him to deliver up his captives. The commander-in-chief landed on 7th January, 1868, and soon after the troops began to move forward through the pass of Senafé, and southward through the districts of Agamé, Tera, Endarta, Wojerat, Lasta, and

Wadela. In the meantime Theodore had been reduced to great straits. His army was rapidly deserting him, and he could hardly obtain food for his followers. He resolved to quit his capital Debra Tabor, which he burned, and set out with the remains of his army for Magdala. During this march he displayed an amount of engineering skill in the construction of roads, of military talent, and fertility of resource, that excited the admiration and astonishment of his enemies. On the afternoon of the 10th of April a force of about 3000 men suddenly poured down upon the English in the plain of Arogié, a few miles from Magdala. They advanced again and again to the charge, but were each time driven back, and finally retired in good order. Early next morning Theodore sent Lieut. Prideaux, one of the captives, and Mr Flad, accompanied by a native chief, to the English camp to sue for peace. Answer was returned, that if he would deliver up all the Europeans in his hands, and submit to the Queen of England, he would receive honourable treatment. The captives were liberated and sent away, and along with a letter to the English general was a present of 1000 cows and 500 sheep, the acceptance of which would, according to Eastern custom, imply that peace was granted. Through some misunderstanding, word was sent to Theodore that the present would be accepted, and he felt that he was now safe; but in the evening he learned that it had not been received, and despair again seized him. Early next morning he attempted to escape with a few of his followers, but subsequently returned. The same day (13th April) Magdala was stormed and taken, and within they found the dead body of the emperor, who had fallen by his own hand. The inhabitants and troops were subsequently sent away, the fortifications destroyed, and the town burned. The queen Terunish having expressed her wish to go back to her own country, accompanied the British army, but died during the march, and her son Alam-ayahu, the only legitimate son of the emperor, was brought to England, as this was the desire of his father. The success of the expedition was in no small degree owing to the aid afforded by the several native chiefs through whose country it passed, and no one did more in this way than Prince Kassai of Tigré. In acknowledgment of this several pieces of ordnance, small arms, and ammunition, with much of the surplus stores, were handed over to him, and the English troops left the country in May 1868. Soon after this Prince Kassai declared his independence; and in a war which broke out between him and Wagsham Gobaze, the latter was defeated, and his territory taken possession of by the conqueror. In 1872 Kassai was crowned king of Abyssinia with great ceremony at Axam, under the title of King Johannes. In that year the governor of Massowah, Munzinger Bey, a Swiss, by command of the Viceroy of Egypt, marched an armed force against the Bogos country. The king solicited the aid of England, Germany, and Russia against the Egyptians, whose troops, however, were after a time withdrawn. Sir Bartle Frere, in the blue-book published respecting his mission to Zanzibar, is of the opinion that England, having regard to the passage to India by the Red Sea, should not have wholly abandoned Abyssinia. (D. K.)

(See Travels of Bruce, 1768-73; Lord Valentia, Salt, 1809-10; Combes et Tamisier, 1835-37; Ferret et Galinier, 1839-43; Rüppell, 1831-33; MM. Th. Lefebvre, A. Petit, et Martin-Dillon, 1839-43; Major Harris; Gobat; Dr C. Beke; Isenberg and Krapf, 1839-42; Mansfield Parkyns; Von Heuglin, 1861-62; H. A. Stern, 1860 and 1868; Dr Blanc, 1868; A. Rassam, 1869; C. R. Markham, 1869; W. T. Blanford, 1870; *Record of the Expedition to Abyssinia*, compiled by order of the Secretary of State for War, by Major T. J. Holland and Captain H. Hozier, 2 vols. 4to, and plates, 1870; various Parliamentary Papers. 1867-68.)

ACACIA, a genus of shrubs and trees belonging to the natural family Leguminosae and the section Mimoseae. The flowers are small, arranged in rounded or elongated clusters. The leaves are compound pinnate in general. In some instances, however, more especially in the Australian species, the leaf-stalks become flattened, and serve the purpose of leaves; the plants are hence called leafless Acacias, and as the leaf-stalks are often placed with their edges towards the sky and earth, they do not intercept light so fully as ordinary trees. There are about 420 species of Acacias widely scattered over the warmer regions of the globe. They abound in Australia and Africa. Various species, such as *Acacia vera*, *arabica*, *Ehrenbergii*, and *torilis*, yield gum arabic; while *Acacia Verek*, *Seyal*, and *Adansoni* furnish a similar gum, called gum Senegal. These species are for the most part natives of Arabia, the north-eastern part of Africa, and the East Indies. The wattles



Leaf of *Acacia heterophylla*.

of Australia are species of *Acacia* with astringent barks. *Acacia dealbata* is used for tanning. An astringent medicine, called catechu orutch, is procured from several species, but more especially from *Acacia Catechu*, by boiling down the wood and evaporating the solution so as to get an extract. The bark of *Acacia arabica*, under the name of *Babul* or *Babool*, is used in Sindh for tanning. *Acacia formosa* supplies the valuable Cuba timber called sabicu. *Acacia Seyal* is the plant which is supposed to be the shittah tree of the Bible, which supplied shittim-wood. The pods of *Acacia nilotica*, under the name of neb-neb, are used by tanners. The seeds of *Acacia Niopo* are roasted and used as snuff in South America. The seeds of all the varieties of *Acacia* in South Australia to the west, called Nundo, are used as food after being roasted. *Acacia melanoxylon*, black wood of Australia, sometimes called light wood, attains a great size; its wood is used for furniture, and receives a high polish. *Acacia homalophylla*, myall wood, yields a fragrant timber, used for ornamental purposes. A kind of *Acacia* is called in Australia Bricklow. In common language the term *Acacia* is often applied to species of the genus *Robinia*, which belongs also to the Leguminosae family, but is placed in a different section. *Robinia Pseudo-acacia*, or false *Acacia*, is cultivated in the milder parts of Britain, and forms a large tree, with beautiful pink pea-like blossoms. The tree is sometimes called the Locust tree.

## ACADEMY

ACADEMY, ἀκαδημία,<sup>1</sup> a suburb of Athens to the north, forming part of the Ceramicus, about a mile beyond the gate named Dypilum. It was said to have belonged to the hero Academus, but the derivation of the word is unknown. It was surrounded with a wall by Hipparchus, and adorned with walks, groves, and fountains by Cimon, the son of Miltiades, who at his death bequeathed it as a public pleasure-ground to his fellow-citizens. The Academy was the resort of Plato, who possessed a small estate in the neighbourhood. Here he taught for nearly fifty years, till his death in 348 B.C.; and from these "groves of the Academy where Plato taught the truth,"<sup>2</sup> his school, as distinguished from the Peripatetics, received the name of the Academics.

The same name (Academia) was in after times given by Cicero to his villa or country-house near Puteoli. There was composed his famous dialogue, *The Academic Questions*.

Of the academic school of philosophy, in so far as it diverged from the doctrines of its great master (see PLATO), we must treat very briefly, referring the reader for particulars to the founders of the various schools, whose names we shall have occasion to mention.

The Academy lasted from the days of Plato to those of Cicero. As to the number of successive schools, the critics are not agreed. Cicero himself and Varro recognised only two, the old and the new; Sextus Empiricus adds a third, the middle; others a fourth, that of Philo and Charmidas; and some even a fifth, the Academy of Antiochus.

Of the old Academy, the principal leaders were Speusippus, Plato's sister's son, and his immediate successor; Xenocrates of Chalcedon, who with Speusippus accompanied Plato in his journey to Sicily; Polemo, a dissolute young

Athenian, who came to laugh at Xenocrates, and remained to listen (Horace, *Sat.*, ii. 3, 253); Crates, and Crantor, the latter of whom wrote a treatise, *περί νέθους*, praised by Cicero. Speusippus, like the Pythagoreans, with whom Aristotle compares him, denied that the Platonic Good could be the first principle of things, for (he said) the Good is not like the germ which gives birth to plants and animals, but is only to be found in already existing things. He therefore derived the universe from a primeval indeterminate unit, distinct from the Good; from this unit he deduced three principles—one for numbers, one for magnitude, and one for the soul. The Deity he conceived as that living force which rules all and resides everywhere. Xenocrates, though like Speusippus infected with Pythagoreanism, was the most faithful of Plato's successors. He distinguished three essences: the sensible, the intelligible, and a third, compounded of the other two. The sphere of the first is all below the heavens, of the second all beyond the heavens, of the third heaven itself. To each of these three spheres one of our faculties corresponds. To the sensible, sense; to the intelligible, intellect or reason; to the mixed sphere, opinion (δόξα). So far he closely follows the psychology and cosmogony of his master; but Cicero notes as the characteristic of both Speusippus and Xenocrates, the abandonment of the Socratic principle of hesitancy.

Of the remaining three, the same writer (who is our principal authority for the history of the Academic school) tells us that they preserved the Platonic doctrine, but emphasised the moral part. On the old Academy he pronounces the following eulogium (*De Fin.* v. 3): "Their writings and method contain all liberal learning, all history, all polite discourse; and besides, they embrace such a variety of arts, that no one can undertake any noble career without their aid. . . . In a word, the Academy is, as it were, the workshop of every artist." Modern criticism has not endorsed this high estimate. They preserved, it is true, and

<sup>1</sup> The bye-form *ἱακαδημία*, which occurs in Diogenes Laertius, is probably a rationalistic attempt to interpret the word, such as we commonly meet with in the writings of Plato.

<sup>2</sup> Horace, *Ep.* ii. 2, 45.



elaborated many details of the Platonic teaching, which we could ill have spared; but of Plato's originality and speculative power, of his poetry and enthusiasm, they inherited nothing; "nor amid all the learning which has been profusely lavished upon investigating their tenets, is there a single deduction calculated to elucidate distinctly the character of their progress or regression."<sup>1</sup> There is a saying of Polemo's, which will illustrate their virtual abandonment of philosophy proper: "We should exercise ourselves in business, not in dialectical speculation."

Arcesilaus, the successor of Crates, the disciple of Theophrastus and Polemo, was the founder of the second or middle Academy. He professed himself the strict follower of Plato, and seems to have been sincerely of opinion that his was nothing but a legitimate development of the true Platonic system. He followed the Socratic method of teaching in dialogues; and, like Socrates, left no writings,—at least the ancients were not acquainted with any. But we have no evidence that he maintained the ideal theory of Plato, and from the general tendency of his teaching it is probable that he overlooked it. He affirmed that neither our senses nor our mind can attain to any certainty; in all we must suspend our judgment; probability is the guide of life. Cicero tells us that he was more occupied in disputing the opinions of others than in advancing any of his own. Arcesilaus is, in fact, the founder of that academic scepticism which was developed and systematised by Carneades, the founder of the third or new Academy. He was the chief opponent of the Stoics and their doctrine of certitude. This is attested by a well-known saying of his: "If there had been no Chrysippus, there would have been no Carneades." To the Stoical theory of perception, the *φαντασία καταληπτική*, by which they expressed a conviction of certainty arising from impressions so strong as to amount to science, he opposed the doctrine of *ἀκαταληψία*, which denied any necessary correspondence between perceptions and the objects perceived. But while denying the possibility of any knowledge of things in themselves, he saved himself from absolute scepticism by the doctrine of probability or verisimilitude, which may serve as a practical guide in life. Thus he announced as his criterion of truth an imagination or impression (*φαντασία*) at once credible, irrefragable, and attested by comparison with other impressions. The wise man might be permitted to hold an opinion, though he allowed that that opinion might be false. In ethics, however, he appeared as the pure sceptic. On his visit to Rome as an ambassador from Athens, he alternately maintained and denied in his public disputations the existence of justice, to the great scandal of Cato and all honest citizens.

On the fourth and fifth Academies, we need not dwell long. Philo and Antiochus both taught Cicero, and without doubt communicated to him that mild scepticism, that eclecticism compounded of almost equal sympathy with Plato and Zeno, which is the characteristic of his philosophical writings. The Academy exactly corresponded to the moral and political wants of Rome. With no genius for speculation, the better Romans of that day were content to embrace a system which, though resting on no philosophical basis, and compounded of heterogeneous dogmas, offered notwithstanding a secure retreat from religious scepticism and political troubles. "My words," says Cicero, speaking as a true Academician, "do not proclaim the truth, like a Pythian priestess; but I conjecture what is probable, like a plain man; and where, I ask, am I to search for anything more than verisimilitude?" And again: "The characteristic of the Academy is never to

interpose one's judgment, to approve what seems most probable, to compare together different opinions, to see what may be advanced on either side, and to leave one's listeners free to judge without pretending to dogmatise."

ACADEMY, in its modern acceptation, signifies a society or corporate body of learned men, established for the advancement of science, literature, or the arts.

The first institution of this sort we read of in history was that founded at Alexandria by Ptolemy Soter, which he named the Museum, *μουσείον*. After completing his conquest of Egypt, he turned his attention to the cultivation of letters and science, and gathered about him a large body of literary men, whom he employed in collecting books and treasures of art. This was the origin of the library of Alexandria, the most famous of the ancient world. Passing by the academies which were founded by the Moors at Grenada, Corduba, and as far east as Samarcand, the next instance of an academy is that founded by Charlemagne at the instigation of the celebrated Alcuin, for promoting the study of grammar, orthography, rhetoric, poetry, history, and mathematics. In order to equalise all ranks, each member took the pseudonym of some ancient author or celebrated person of antiquity. For instance, Charlemagne himself was David, Alcuin became Flaccus Albinus. Though none of the labours of this academy have come down to us, it undoubtedly exerted considerable influence in modelling the language and reducing it to rules.

In the following century Alfred founded an academy at Oxford. This was rather a grammar school than a society of learned men, and from it the University of Oxford originated.

But the academy which may be more justly considered as the mother of modern European academies is that of *Floral Games*, founded at Toulouse in the year 1325, by Clemens Isaurus. Its object was to distribute prizes and rewards to the troubadours. The prizes consisted of flowers of gold and silver. It was first recognised by the state in 1694, and confirmed by letters-patent from the king, and its numbers limited to thirty-six. It has, except during a few years of the republic, continued to the present day, and distributes annually the following prizes:—An amaranth of gold for the best ode, a silver violet for a poem of sixty to one hundred Alexandrine lines, a silver eglantine for the best prose composition, a silver marigold for an elegy, and a silver lily presented in the last century by M. de Malpeyre for a hymn to the Virgin.

It was the Renaissance which was *par excellence* the era of academies, and as the Italians may be said to have discovered anew the buried world of literature, so it was in Italy that the first and by far the most numerous academies arose. The earliest of these was the *Platonic Academy*, founded at Florence by Cosmo de Medici for the study of the works of Plato, though subsequently they added the explanation of Dante and other Italian authors.

Marsilius Ficinus, its principal ornament, in his *Theologica Platonica*, developed a system, chiefly borrowed from the later Platonists of the Alexandrian school, which, as it seemed to coincide with some of the leading doctrines of Christianity, was allowed by the church. His Latin translation of Plato is at once literal, perspicuous, and correct and as he had access to MSS. of Plato now lost, it has in several places enabled us to recover the original reading. After the expulsion of the Medici from Florence, the Platonic Academy was dissolved.

In giving some account of the principal academies of Europe, which is all that this article professes to do, we shall, as far as possible, arrange them under different heads, according to—1st, The object which they were designed to promote; 2d, The countries to which they belong. This classification, though, perhaps, the best available, is

<sup>1</sup> Archer Butler, *Lect. on Anc. Phil.* ii. 815

necessarily imperfect, inasmuch as several of those we shall mention were at once literary and scientific, and many associations for similar objects were known by some other name. Thus, with the doubtful exception of the Royal Academy of Arts, England has no academies in the proper sense of the word. For those institutions in England which answer to Italian academies, we must refer the reader to the article SOCIETY.

**I. SCIENTIFIC ACADEMIES.—Italy.**—The first society for the prosecution of physical science was that established at Naples, 1560, under the presidency of Baptista Porta. It was called *Academia Secretorum Naturæ* or *de Secretis*. It arose from a meeting of some scientific friends, who assembled at Porta's house, and called themselves the *Otiosi*. No member was admitted who had not made some useful discovery in medicine or natural philosophy. The name suggested to an ignorant public the prosecution of magic and the black arts. Porta went to Rome to justify himself before Paul III. He was acquitted by the Pope, but the academy was dissolved, and he was ordered to abstain for the future from the practice of all illicit arts.

At Rome he was admitted to the *Lincei*, an academy founded by Federigo Cesi, the Marcese di Monticelli. The device of the Lincei was a lynx with its eyes turned towards heaven tearing a Cerberus with its claws, intimating that they were prepared to do battle with error and falsehood. Their motto was the verse of Lucretius describing rain dropping from a cloud—"Redit agmine dulci." Besides Porta, Galileo and Colonna were enrolled among its members. The society devoted itself exclusively to physical science. Porta, under its auspices, published his great work, *Magie Naturalis libri xx.*, 1589, in fol.; his *Phytognomonica*, or, the occult virtue of plants; his *De Humana Physiognomia*, from which Lavater largely borrowed; also various works on optics and pneumatics, in which he approached the true theory of vision. He is even said by some to have anticipated Galileo in the invention of the telescope.

But the principal monument still remaining of the zeal and industry of Cesi and his academy is the *Phytobasanos*, a compendium of the natural history of Mexico, written by a Spaniard, Hernandez. During fifty years the MS. had been neglected, when Cesi discovered it, and employed Terentio, Fabro, and Colonna, all Lynceans, to edit it and enrich it with notes and emendations. Cesi's own great work, *Theatrum Naturæ*, was never published. The MS. still exists in the Albani Library at Rome. After Cesi's death, 1630, the academy languished for some years under the patronage of Urban VIII. An academy of the same name was inaugurated at Rome 1784, and still flourishes. It numbers among its members some of our English philosophers. But the fame of the *Lincei* was far outstripped by that of the *Accademia del Cimento*, established in Florence 1657, under the patronage of the Grand Duke Ferdinand II., at the instigation of his brother Leopold, acting under the advice of Viviani, one of the greatest geometers of Europe. The object of this academy was (as the name implies) to make experiments and relate them, abjuring all preconceived notions. Unfortunately for science, it flourished for only ten years. Leopold in 1667 was made a cardinal, and the society languished without its head. It has, however, left a record of its labours in a volume containing an account of the experiments, published by the secretary in 1667. It is in the form of a beautifully printed folio, with numerous full print pages of illustrations. It contains, among others, those on the supposed incompressibility of water, on the pressure of the air, and on the universal gravity of bodies. Torricelli, the inventor of the barometer, was one of its members.

Passing by numerous other Italian Academies of Science, we come to those of modern times.

The Royal Academy of Sciences at Turin originated in 1757 as a private society; in 1759 it published a volume of *Miscellanea Philosophico-Mathematica Societatis privatae Taurinensis*; shortly after, it was constituted a Royal Society by Charles Emanuel III., and in 1783 Victor Amadeus III. made it a Royal Academy of Sciences. It consists of 40 members, residents of Turin, 20 non-resident, and 20 foreign members. It publishes each year a quarto volume of proceedings, and has crowned and awarded prizes to many learned works.

**France.**—The Old Academy of Sciences originated in much the same way as the French Academy. A private society of scientific men had for some thirty years been accustomed to meet first at the house of Montmort, the maître des requêtes, afterwards at that of Thevenot, a great traveller and man of universal genius, in order to converse on their studies, and communicate their discoveries. To this society belonged, among others, Descartes, Gassendi, Blaise Pascal, and his father. Hobbes, the philosopher of Malmesbury, was presented to it during his visit to Paris in 1640. Colbert, just as Richelieu in the case of the French Academy, conceived the idea of giving an official status to this body of learned men. Seven eminent mathematicians, among whom were Huyghens and De Bessy, the author of a famous treatise on magic squares, were chosen to form the nucleus of the new society. A certain number of chemists, physicians, and anatomists were subsequently added. Pensions were granted by Louis XIV. to each of the members, and a fund for instruments and experimentations placed at their disposal. They commenced their session the 22d December 1666 in the Royal Library. They met twice a week—the mathematicians on the Wednesdays, the physicists (as the naturalists and physiologists were then called) on the Saturdays. Duhamel was appointed secretary by the king. This post he owed more to his polished Latinity than to his scientific attainments, all the proceedings of the society being recorded in Latin. A treasurer was also nominated, who, notwithstanding his pretentious title, was nothing more than conservator of the scientific instruments, &c. At first the academy was rather a laboratory and observatory than an academy proper. Experiments were undertaken in common and results discussed. Several foreign savants, in particular the Danish astronomer Rømer, joined the society, attracted by the liberality of the Grand Monarque; and the German physician and geometer Tschirnhausen and Sir Isaac Newton were made foreign associates. The death of Colbert, who was succeeded by Louvois, exercised a disastrous effect on the fortunes of the academy. The labours of the academicians were diverted from the pursuit of pure science to such works as the construction of fountains and cascades at Versailles, and the mathematicians were employed to calculate the odds of the games of lansquenet and bassett. In 1699 the academy was reconstituted by M. de Pontchartrain, under whose department as secretary of state the academies came. By its new constitution it consisted of ten honorary members, men of high rank, who interested themselves in science, fifteen pensionaries, who were the working members, viz., three geometricians, and the same number of astronomers, mechanicians, anatomists, and chemists. Each section of three had two associates attached to it, and besides, each pensionary had the power of naming a pupil. There were eight foreign and four free associates. The officers were, a president and a vice-president, named by the king from among the honorary members, and a secretary and treasurer chosen from the pensionaries, who held their offices for life. Fontenelle, a man of wit, and rather a populariser of sciences than an original investigator, succeeded Duhamel as



secretary. The constitution, as is evident, was purely aristocratical, and unlike that of the French Academy, in which the principle of equality among the members was never violated. Science was not yet strong enough to dispense with the patronage of the great. The two leading spirits of the academy at this period were Clairaut and Réaumur. Clairaut was the first to explain capillary attraction, and predicted within a few days of the correct time the return of Halley's comet. His theory on the figure of the earth was only superseded by Laplace's *Mécanique Céleste*. Réaumur was principally distinguished by his practical discoveries, and a thermometer in common use at the present day bears his name.

To trace the subsequent fortunes of this academy would far exceed our limits, being equivalent to writing the history of the rise and progress of science in France. It has reckoned among its members Laplace, Buffon, Lagrange, D'Alembert, Lavoisier, and Jussieu, the father of modern botany. Those of our readers who wish for further information we would refer to M. Alfred Maury's excellent history.

On 21st December 1792, the old Academy of Sciences met for the last time. Many of the members fell by the guillotine, many were imprisoned, more reduced to indigence. The aristocracy of talent was almost as much detested and persecuted by the Revolution as that of rank.

In 1795 the Convention decided on founding an Institute, which was to replace all the academies. The first class of the Institute corresponded closely to the old academy. See INSTITUTE.

In 1816 the Academy was reconstituted as a branch of the Institute. The new academy has reckoned among its members, besides many other brilliant names, Carnot the engineer, the physicians Fresnel, Ampère, Arago, Biot, the chemists Gay-Lussac and Thénard, the zoologists G. Cuvier and the two Geoffroy Saint-Hilaires.

The French had also considerable academies in most of their large towns. Montpellier, for example, had a Royal Academy of Sciences, founded in 1706 by Louis XIV., on nearly the same footing as that at Paris, of which, indeed, it was in some measure the counterpart. It was reconstituted in 1847, and organised under three sections—medicine, science, and letters. It has continued to publish annual reports of considerable value. Toulouse also had an academy under the denomination of Lanternists; and there were analogous institutions at Nîmes, Arles, Lyons, Dijon, Bordeaux, and other places. Of these several, we believe, are still in existence, if not in activity.

Before passing on to German academies, we may here notice a private scientific and philosophical society, the precursor of the French Academy of Sciences. It does not appear to have had any distinguishing name; but the promoter of it was Eusebius Renaudot, Counsellor and Physician in Ordinary to the King of France, and Doctor Regent of the Faculty of Physic at Paris; by whom a full account of its conferences was published, translated into English by G. Havers, 1664. In the preface it is said to be "a production of an assembly of the choicest wits of France." We will quote a few of the subjects of these discussions in order to show the character of the society:—"Why the loadstone draws iron;" "Whether the soul's immortality is demonstrable by natural reason;" "Of the little hairy girl lately seen in this city." On subjects of popular superstition their views were far in advance of the time. Of judicial astrology it is said, "Why should we seek in heaven the causes of accidents which befall us if we can find them on earth?" Of the philosopher's stone—"This most extravagant conceit, that it is the panacea, joined to the other absurdities of that chimerical art, makes us believe that it is good for nothing but to serve for imaginary consolation to the miserable."

*Germany.*—The *Collegium Curiosum* was a scientific society, founded by J. C. Sturm, professor of mathematics and natural philosophy in the University of Altorff, in Franconia, in 1672, on the plan of the Accademia del Cimento. It originally consisted of 20 members, and continued to flourish long after the death of its founder. The early labours of the society were devoted to the repetition (under varied conditions) of the most notable experiments of the day, or to the discussion of the results. Two volumes of proceedings were published by Sturm in 1676 and 1685 respectively. The *Programma Invitationalium* is dated June 3, 1672; and Sturm therein urges that, as the day of disputatious philosophy had given way to that of experimental philosophy, and as, moreover, scientific societies had been founded at Florence, London, and Rome, it would therefore seem desirable to found one in Germany, for the attainment of which end he requests the co-operation of the learned.

The work of 1676, entitled *Collegium Experimentale sive Curiosum*, commences with an account of the diving-bell, "a new invention;" next follow chapters on the camera obscura, the Torricellian experiment, the air-pump, microscope, telescope, &c. The two works have been pronounced by a competent authority<sup>1</sup> to constitute a nearer approach to a text-book of the physics of the period than any preceding work.

The *Royal Academy of Sciences at Berlin* was founded in 1700 by Frederic I. after Leibnitz' comprehensive plan, but was not opened till 1711. Leibnitz was the first president. Under Maupertuis, who succeeded him, it did good service. Its present constitution dates from January 24, 1812. It is divided into four sections—physical, mathematical, philosophical, and historical. Each section is under a paid secretary elected for life; each secretary presides in turn for a quarter of a year. The members are—1st, Regular members who are paid; these hold general meetings every Thursday, and sectional meetings every Monday. 2d, Foreign members, not to exceed 24 in number. 3d, Honorary members and correspondents. Since 1811 it has published yearly, *Mémoires de l'Académie Royale des Sciences et Belles Lettres à Berlin*. For its scientific and philosophical attainments the names of W. and A. v. Humboldt, Ideles, Savigny, Schleiermacher, Bopp, and Ranke, will sufficiently vouch.

The *Academy of Sciences at Mannheim* was established by Charles Theodore, Elector Palatine, in the year 1755. The plan of this institution was furnished by Schæpflin, according to which it was divided into two classes, the historical and physical. In 1780 a sub-division of the latter took place into the physical, properly so-called, and the meteorological. The meteorological observations are published separately, under the title of *Ephemerides Societatis Meteorologica Palatina*. The historical and physical memoirs are published under the title of *Acta Academiæ Theodoro-Palatinae*.

The *Electoral Bavarian Academy of Sciences at Munich* was established in 1759, and publishes its memoirs under the title of *Abhandlungen der Bayerischen Akademie*. Soon after the Elector of Bavaria was raised to the rank of king, the Bavarian government, by his orders, directed its attention to a new organisation of the Academy of Sciences of Munich. The design of the king was, to render its labours more extensive than those of any similar institution in Europe, by giving to it, under the direction of the ministry, the immediate superintendence over all the establishments for public instruction in the kingdom of Bavaria. The Privy-Councillor Jacobi, a man of most excellent character, and of considerable scientific attainments, was appointed president.

<sup>1</sup> Mr G. F. Rodwell, in the *Chemical News*, June 21, 1867.

The *Electoral Academy at Erfurt* was established by the Elector of Mentz, in the year 1754. It consists of a protector, president, director, assessors, adjuncts, and associates. Its object is to promote the useful sciences. The memoirs were originally published in Latin, but afterwards in German. The Hessian Academy of Sciences at Giessen publish their transactions under the title of *Acta Philosophico-Medica Academiae Scientiarum Principalis Hesiaca*. In the Netherlands there are scientific academies at Flushing and Brussels, both of which have published their transactions.

*Russia.*—The *Imperial Academy of Sciences at St Petersburg* was projected by the Czar Peter the Great. Having in the course of his travels observed the advantage of public societies for the encouragement and promotion of literature, he formed the design of founding an academy of sciences at St Petersburg. By the advice of Wolff and Leibnitz, whom he consulted on this occasion, the society was accordingly regulated, and several learned foreigners were invited to become members. Peter himself drew the plan, and signed it on the 10th of February 1724; but he was prevented, by the suddenness of his death, from carrying it into execution. His decease, however, did not prevent its completion; for on the 21st of December 1725, Catharine I. established it according to Peter's plan, and on the 27th of the same month the society assembled for the first time. On the 1st of August 1726, Catharine honoured the meeting with her presence, when Professor Bulfinger, a German naturalist of great eminence, pronounced an oration upon the advances made in the theory of magnetic variations, and also on the progress of research in so far as regarded the discovery of the longitude. A short time afterwards the empress settled a fund of £4982 per annum for the support of the academy; and 15 members, all eminent for their learning and talents, were admitted and pensioned, under the title of professors in the various branches of science and literature. The most distinguished of these professors were Nicholas and Daniel Bernouilli, the two De Lisle, Bulfinger, and Wolff.

During the short reign of Peter II. the salaries of the members were discontinued, and the academy utterly neglected by the Court; but it was again patronised by the Empress Anne, who even added a seminary for the education of youth under the superintendence of the professors. Both institutions flourished for some time under the direction of Baron Korf; but upon his death, towards the end of Anne's reign, an ignorant person being appointed president, many of the most able members quitted Russia. At the accession of Elizabeth, however, new life and vigour were infused into the academy. The original plan was enlarged and improved; some of the most learned foreigners were again drawn to St Petersburg; and what was considered as a good omen for the literature of Russia, two natives, Lomonosof and Rumovsky, men of genius and abilities, who had prosecuted their studies in foreign universities, were enrolled among its members. Lastly, the annual income was increased to £10,659, and sundry other advantages were conferred upon the institution.

The Empress Catharine II., with her usual zeal for promoting the diffusion of knowledge, took this useful society under her immediate protection. She altered the court of directors greatly to the advantage of the whole body, corrected many of its abuses, and infused a new vigour and spirit into their researches. By Catharine's particular recommendation the most ingenious professors visited the various provinces of her vast dominions; and as the funds of the academy were not sufficient to defray the whole expense of these expeditions, the empress supplied the deficiency by a grant of £2000, which was renewed as occasion required.

The purpose and object of these travels will appear from the instructions given by the academy to the several persons who engaged in them. They were ordered to institute inquiries respecting the different sorts of earths and waters; the best methods of cultivating barren and desert spots; the local disorders incident to men and animals, together with the most efficacious means of relieving them; the breeding of cattle, particularly of sheep; the rearing of bees and silk-worms; the different places and objects for fishing and hunting; minerals of all kinds; the arts and trades; and the formation of a *Flora Russica*, or collection of indigenous plants. They were particularly instructed to rectify the longitude and latitude of the principal towns; to make astronomical, geographical, and meteorological observations; to trace the courses of rivers; to construct the most exact charts; and to be very distinct and accurate in remarking and describing the manners and customs of the different races of people, their dresses, languages, antiquities, traditions, history, religion; in a word, to gain every information which might tend to illustrate the real state of the whole Russian empire. More ample instructions cannot well be conceived; and they appear to have been very zealously and faithfully executed. The consequence was that, at that time, no country could boast, within the space of so few years, such a number of excellent publications on its internal state, its natural productions, its topography, geography, and history, and on the manners, customs, and languages of the different tribes who inhabit it, as issued from the press of this academy. In its researches in Asiatic languages, and general knowledge of Oriental customs and religions, it proved itself the worthy rival of our own Royal Asiatic Society.

The first transactions of this society were published in 1728, and entitled *Commentarii Academiae Scientiarum Imperialis Petropolitanae ad annum 1726*, with a dedication to Peter II. The publication was continued under this form until the year 1747, when the transactions were called *Novi Commentarii Academiae*, &c.; and in 1777, the academy again changed the title into *Acta Academiae Scientiarum Imperialis Petropolitanae*, and likewise made some alteration in the arrangements and plan of the work. The papers, which had been hitherto published in the Latin language only, were now written indifferently either in that language or in French, and a preface added, entitled *Partie Historique*, which contains an account of its proceedings, meetings, the admission of new members, and other remarkable occurrences. Of the *Commentaries*, 14 volumes were published: the first of the *New Commentaries* made its appearance in 1750, and the twentieth in 1776. Under the new title of *Acta Academiae*, a number of volumes have been given to the public; and two are printed every year. These transactions abound with ingenious and elaborate disquisitions upon various parts of science and natural history; and it may not be an exaggeration to assert, that no society in Europe has more distinguished itself for the excellence of its publications, particularly in the more abstruse parts of pure and mixed mathematics.

The academy is still composed, as at first, of 15 professors, besides the president and director. Each of these professors has a house and an annual stipend of from £200 to £600. Besides the professors, there are four adjuncts, with pensions, who are present at the sittings of the society, and succeed to the first vacancies. The direction of the academy is generally entrusted to a person of distinction.

The buildings and apparatus of this academy are on a vast scale. There is a fine library, consisting of 36,000 curious books and manuscripts; together with an extensive museum, in which the various branches of natural history, &c., are distributed in different apartments. The latter is extremely rich in native productions, having been consti-



derably augmented by the collections made by Pallas, Gmelin, Guldensædt, and other professors, during their expeditions through the various parts of the Russian empire. The stuffed animals and birds occupy one apartment. The chamber of rarities, the cabinet of coins, &c., contain innumerable articles of the highest curiosity and value. The motto of the society is exceedingly modest; it consists of only one word, *Paulatim*.

*Sweden.*—The Academy of Sciences at Stockholm, or the Royal Swedish Academy, owes its institution to six persons of distinguished learning, among whom was the celebrated Linnaeus. They originally met on the 2d of June 1739, when they formed a private society, in which some dissertations were read; and in the end of the same year their first publication made its appearance. As the meetings continued and the members increased, the society attracted the notice of the king; and, accordingly, on the 31st of March 1741, it was incorporated under the name of the Royal Swedish Academy. Not receiving any pension from the crown, it is merely under the protection of the king, being directed, like our Royal Society, by its own members. It has now, however, a large fund, which has chiefly arisen from legacies and other donations; but a professor of experimental philosophy, and two secretaries, are still the only persons who receive any salaries. Each of the members resident at Stockholm becomes president by rotation, and continues in office during three months. There are two kinds of members, native and foreign; the election of the former takes place in April, that of the latter in July; and no money is paid at the time of admission. The dissertations read at each meeting are collected and published four times in the year: they are written in the Swedish language, and printed in octavo, and the annual publications make a volume. The first 40 volumes, which were completed in 1779, are called the *Old Transactions*.

*Denmark.*—The Royal Academy of Sciences at Copenhagen owes its institution to the zeal of six individuals, whom Christian VI., in 1742, ordered to arrange his cabinet of medals. These persons were John Gram, Joachim Frederic Ramus, Christian Louis Scheid, Mark Woldickey, Eris Pontopidan, and Bernard Moelmann, who, occasionally meeting for this purpose, extended their designs; associated with them others who were eminent in several branches of science; and forming a kind of literary society, employed themselves in searching into, and explaining the history and antiquities of their country. The Count of Holstein, the first president, warmly patronised this society, and recommended it so strongly to Christian VI. that, in 1743, his Danish majesty took it under his protection, called it the Royal Academy of Sciences, endowed it with a fund, and ordered the members to join to their former pursuits natural history, physics, and mathematics. In consequence of the royal favour the members engaged with fresh zeal in their pursuits; and the academy has published 15 volumes in the Danish language, some of which have been translated into Latin.

*England.*—In 1616 a scheme for founding a Royal Academy was started by Edmund Bolton, an eminent scholar and antiquary. Bolton, in his petition to King James, which was supported by George Villiers, Marquis of Buckingham, proposed that the title of the academy should be "King James, his Academe or College of honour." In the list of members occurs the name of Sir Kenelm Digby, one of the original members of the Royal Society. The death of the king proved fatal to the undertaking. In 1635 a second attempt was made to found an academy, under the patronage of Charles I., with the title of "Minerva's Museum," for the instruction of young noblemen in the liberal arts and sciences, but the project was soon dropped. About 1645 some of the more ardent followers

of Bacon used to meet, some in London, some at Oxford, for the discussion of subjects connected with experimental science. This was the origin of the Royal Society, which received its charter in 1662. See ROYAL SOCIETY.

*Ireland.*—The Royal Irish Academy arose out of a society established at Dublin about the year 1782, and consisting of a number of gentlemen, most of whom belonged to the university. They held weekly meetings, and read essays in turn on various subjects. The members of this society afterwards formed a more extensive plan, and, admitting only such names as might add dignity to their new institution, became the founders of the Royal Irish Academy. They professed to unite the advancement of science with the history of mankind and polite literature. The first volume of their transactions (for 1787) appeared in 1788, and seven volumes were afterwards published. A society was formed in Dublin, similar to the Royal Society in London, as early as the year 1683; but the distracted state of the country proved unpropitious to the cultivation of philosophy and literature.

*Holland.*—The Royal Academy of Sciences at Amsterdam, erected by a royal ordinance 1852, succeeded the Royal Institute of the Low Countries, founded by Louis Napoleon, King of Holland, 1808. In 1855 it had published 192 volumes of proceedings, and received an annual subsidy of 14,000 florins from the state.

*Spain.*—The Academy of Sciences at Madrid, founded 1774, after the model of the French Academy.

*Portugal.*—The Academy of Sciences at Lisbon is divided into three classes—natural history, mathematics, and national literature. It consists of 24 ordinary and 36 extraordinary members. Since 1779 it has published *Memorias de Letteratura Portugueza; Memorias Economicas: Collecção de Livros ineditos di Historia Portugueza*.

II. ACADEMIES OF BELLES LETTRES.—*Italy.*—Italy in the 16th century was remarkable for the number of its literary academies. Tiraboschi, in his *History of Italian Literature*, has given a list of 171; and Jarkius, in his *Specimen Historiæ Academicarum, Conditarum*, enumerates nearly 700. Many of these, with a sort of Socratic irony, gave themselves names expressive of ignorance or simply ludicrous. Such were the *Lunatics* of Naples, the *Estravaganti*, the *Fulminales*, the *Trapessati*, the *Drowsy*, the *Sleepers*, the *Anxious*, the *Confused*, the *Unstable*, the *Fantastic*, the *Transformed*, the *Ethereal*. "The first academies of Italy chiefly directed their attention to classical literature; they compared manuscripts; they suggested new readings, or new interpretations; they deciphered inscriptions or coins; they sat in judgment on a Latin ode, or debated the propriety of a phrase. Their own poetry had, perhaps, never been neglected; but it was not till the writings of Bembo furnished a new code of criticism in the Italian language, that they began to study it with the same minuteness as modern Latin." "They were encouragers of a numismatic and lapidary erudition, elegant in itself, and throwing for ever little specks of light on the still ocean of the past, but not very favourable to comprehensive observation, and tending to bestow on an unprofitable pedantry the honours of real learning."<sup>1</sup> The Italian nobility, excluded as they mostly were from politics, and living in cities, found in literature a consolation and a career. Such academies were oligarchical in their constitution; they encouraged culture, but tended to hamper genius and extinguish originality. Of their academies, by far the most celebrated was the *Accademia della Crusca* or *Furfuratorum*; that is, of Bran, or of the Sifted. The title was borrowed from a previous society at Perugia, the *Accademia degli Scossi*, of the Well-shaken: Its device

<sup>1</sup> Hallam's *Int. to Lit. of Europe*, vol. I. 654. and vol. II. 602.

was a sieve; its motto, "Il più bel fior ne coglie," it collects the finest flour of it; its principal object the purification of the language. Its great work was the *Vocabolario della Crusca*, the first edition of which was published 1613. It was composed avowedly on Tuscan principles, and regarded the 14th century as the Augustan period of the language. Beni assailed it in his *Anti-Crusca*, and this exclusive Tuscan spirit has disappeared in subsequent editions. The Accademia della Crusca is now incorporated with two older societies—the Accademia degli Apatici (the Impartials) and the Accademia Fiorentina.

Among the numerous other literary academies of Italy we may mention the Academy of Naples, founded about 1440 by Alfonso, the king; the *Academy of Florence*, founded 1540, to illustrate and perfect the Tuscan tongue, especially by a close study of Petrarch; the *Intronati* of Siena, 1525; the *Inflammati* of Padua, 1534; the *Rozzi* of Siena, suppressed by Cosmo, 1568.

The *Academy of Humourists, Umoristi*, had its origin at Rome in the marriage of Lorenzo Marcini, a Roman gentleman, at which several persons of rank were guests. It was carnival time, and so to give the ladies some diversion, they betook themselves to the reciting of verses, sonnets, speeches, first *extempore*, and afterwards premeditated, which gave them the denomination of *Belli Humori*. After some experience, and coming more and more into the taste of these exercises, they resolved to form an academy of belles lettres, and changed the title of *Belli Humori* for that of *Humoristi*.

In 1690 the *Academy or Society of Arcadians* was established at Rome, for the purpose of reviving the study of poetry. The founder Orescimbeni is the author of a well-known history of Italian poetry. It numbered among its members many princes, cardinals, and other ecclesiastics; and, to avoid disputes about pre-eminence, all appeared masked after the manner of Arcadian shepherds. Within ten years from its first establishment the number of *academicians* amounted to 600.

The *Royal Academy of Savoy* dates from 1719, and was made a royal academy by Charles Felix in 1848. Its emblem is a gold orange tree full of flowers and fruit; its motto "Flores fructusque perennes," being the same as those of the famous *Florimontane* Academy, founded at Annecy by St Francis de Sales. It has published valuable memoirs on the history and antiquities of Savoy.

*Germany.*—Of the German literary academies, the most celebrated was *Die Fruchtbringende Gesellschaft*, the Fruitful Society, established at Weimar 1617. Five princes enrolled their names among the original members. The object was to purify the mother tongue. The German academies copied those of Italy in their quaint titles and petty ceremonials, and exercised little permanent influence on the language or literature of the country.

*France.*—The *French Academy* was established by order of the king in the year 1635, but in its original form it came into existence some four or five years earlier. About the year 1629 certain literary friends in Paris agreed to meet weekly at the house of one of their number. These meetings were quite informal, but the conversation turned mostly on literary topics; and when, as was often the case, one of the number had composed some work, he read it to the rest, and they gave their opinions upon it. The place of meeting was the house of M. Conrard, which was chosen as being the most central. The fame of these meetings, though the members were bound over to secrecy, reached at length the ears of Cardinal Richelieu, who conceived so high an opinion of them, that he at once promised them his protection, and offered to incorporate them by letters patent. Nearly all the members would have preferred the charms of privacy, but, considering the risk they would run in

incurring the cardinal's displeasure, and that by the letter of the law all meetings of any sort or kind were prohibited, they expressed their gratitude for the high honour the cardinal thought fit to confer on them. They proceeded at once to organise their body, settle their laws and constitution, appoint officers, and choose their name. Their officers consisted of a director and a chancellor, both chosen by lot, and a permanent secretary, chosen by votes. They elected besides a publisher, not a member of the body. The director presided at the meetings, being considered as *primus inter pares*, and performing much the same part as the speaker in the English House of Commons. The chancellor kept the seals, and sealed all the official documents of the academy. The office of the secretary explained itself. The cardinal was *ex officio* protector. The meetings were weekly as before.

The letters patent were at once granted by the king, but it was only after violent opposition and long delay that the president, who was jealous of the cardinal's authority, consented to grant the verification required by the old constitution of France.

The object for which the academy was founded, as set forth in its statutes, was the purification of the French language. "The principal function of the academy shall be to labour with all care and diligence to give certain rules to our language, and to render it pure, eloquent, and capable of treating the arts and sciences" (Art. 24). They proposed "to cleanse the language from the impurities it has contracted in the mouths of the common people, from the jargon of the lawyers, from the misusages of ignorant courtiers, and the abuses of the pulpit."—*Letter of Academy to Cardinal Richelieu*.

Their numbers were fixed at forty. The original members who formed the nucleus of the body were eight, and it was not till 1639 that the full number was completed. Their first undertaking consisted of essays written by all the members in rotation. To judge by the titles and specimens which have come down to us, these possessed no special originality or merit, but resembled the *επιδείξεις* of the Greek rhetoricians. They next, at the instance of Cardinal Richelieu, undertook a criticism of Corneille's *Cid*, the most popular work of the day. It was a rule of the academy that no work could be criticised except at the author's request. It was only the fear of incurring the cardinal's displeasure which wrung from Corneille an unwilling consent. The critique of the academy was rewritten several times before it met with the cardinal's approbation. After six months of elaboration, it was published under the title, *Sentiments de l'Académie Française sur le Cid*. This judgment did not satisfy Corneille, as a saying attributed to him on the occasion shows. "*Horatius*," he said, referring to his last play, "was condemned by the Duumviri, but he was absolved by the people." But the crowning labour of the academy, commenced in 1639, was a dictionary of the French language. By the twenty-sixth article of their statutes, they were pledged to compose a dictionary, a grammar, a treatise on rhetoric, and one on poetry. M. Chapelain, one of the original members and leading spirits of the academy, pointed out that the dictionary would naturally be the first of these works to be undertaken, and drew up a plan of the work, which was to a great extent carried out. A catalogue was to be made of all the most approved authors, prose and verse: these were to be distributed among the members, and all words and phrases of which they approved to be marked by them in order to be incorporated in the dictionary. For this they resolved themselves into two committees, which sat on other than the regular days. M. de Vaugelas<sup>1</sup>

<sup>1</sup> A bon mot of his is worth recording. When returning thanks for



was appointed editor in chief. To remunerate him for his labours, he received from the cardinal a pension of 2000 francs. The first edition of this dictionary appeared in 1694, the last *Complément* in 1854.

Instead of following the history of the French Academy,—which, like its two younger sisters, the Academy of Sciences and the Academy of Inscriptions, was suppressed in 1793, and reconstituted in 1795, as a class of the Institute,—a history which it would be impossible to treat adequately in the limit of an article, we will attempt briefly to estimate its influence on French literature and language, and point out its principal merits and defects. To begin with its merits, it may justly boast that there is hardly a single name of the first rank among French *littérateurs* that it has not enrolled among its members. Molière, it is true, was rejected as a player; but we can hardly blame the academy for a social prejudice which it shared with the age; and it is well known that it has, as far as was in its power, made the *amende honorable*. In the *Salle des Séances* is placed the bust of the greatest of modern comedians, with the inscription, “Rien ne manque à sa gloire; il manquait à la notre.” Descartes was excluded from the fact of his residing in Holland. Scarron was confined by paralysis to his own house. Pascal is the only remaining exception, and Pascal was better known to his contemporaries as a mathematician than a writer. His *Lettres Provinciales* were published anonymously; and just when his fame was rising he retired to Port-Royal, where he lived the life of a recluse. On the other hand, it cannot be denied that the *fauteuils* have often been occupied by men of no mark in literature. Nor is the academy wholly exonerated by M. Livet’s ingenious defence, that there are but eight marshals in the French army, and yet the number has never appeared too restricted; for its most ardent admirers will not assert that it has, as a rule, chosen the forty most distinguished living authors. Court intrigue, rank, and *finesse* have too often prevailed over real merit and honesty. Though his facts are incorrect, there is much truth in Courier’s caustic satire:—“Dans une compagnie de gens faisant profession d’esprit ou de savoir, nul ne veut près de soi un plus habile que soi, mais bien un plus noble, un plus riche: un duc et pair honore l’Académie Française, qui ne veut point de Boileau,<sup>1</sup> refuse la Bruyère, fait attendre Voltaire, mais reçoit tout d’abord Chapelain et Conrart.”

We have next to consider the influence of the French Academy on the language and literature, a subject on which the most opposite opinions have been advanced. On the one hand, it has been asserted that it has corrected the judgment, purified the taste, and formed the language of French writers, and that to it we owe the most striking characteristics of French literature, its purity, delicacy, and flexibility. Thus Mr Matthew Arnold, in his well-known *Essay on the Literary Influence of Academies*, has pronounced a glowing panegyric on the French Academy as a high court of letters, and rallying point for educated opinion, as asserting the authority of a master in matters of tone and taste. To it he attributes in a great measure that thoroughness, that openness of mind, that absence of vulgarity which he finds everywhere in French literature; and to the want of a similar institution in England he traces that eccentricity, that provincial spirit, that coarseness, which, as he thinks, is barely compensated by English genius. Thus, too, M. Renán, one of its most distinguished living members, says that it is owing to the academy “qu’on

peut tout dire sans appareil scholastique avec la langue des gens du monde.” “Ah ne dites,” he exclaims, “qu’ils n’ont rien fait, ces obscures beaux esprits dont la vie se passe à instruire le procès des mots, à peser les syllabes. Ils ont fait un chef-d’œuvre—la langue française.” On the other hand, its inherent defects have been so well jumbled up by M. Lanfrey, that we cannot do better than quote from his recent *History of Napoleon*. “This institution,” he says, speaking of the French Academy, “had never shown itself the enemy of despotism. Founded by the monarchy and for the monarchy, eminently favourable to the spirit of intrigue and favouritism, incapable of any sustained or combined labour, a stranger to those great works pursued in common which legitimise and glorify the existence of scientific bodies, occupied exclusively with learned trifles, fatal to emulation, which it pretends to stimulate, by the compromises and calculations to which it subjects it, directed in everything by petty considerations, and wasting all its energy in childish tournaments, in which the flatteries that it showers on others are only the foretaste of the compliments it expects in return for itself, the French Academy seems to have received from its founders the special mission to transform genius into *bel esprit*, and it would be hard to produce a man of talent whom it has not demoralised. Drawn in spite of itself towards politics, it alternately pursues and avoids them; but it is specially attracted by the gossip of politics, and whenever it has so far emancipated itself as to go into opposition, it does so as the champion of ancient prejudices. If we examine its influence on the national genius, we shall see that it has given it a flexibility, a brilliancy, a polish, which it never possessed before; but it has done so at the expense of its masculine qualities, its originality, its spontaneity, its vigour, its natural grace. It has disciplined it, but it has emasculated, impoverished, and rigidified it. It sees in taste, not a sense of the beautiful, but a certain type of correctness, an elegant form of mediocrity. It has substituted pomp for grandeur, school routine for individual inspiration, elaborateness for simplicity, *fadéur* and the monotony of literary orthodoxy for variety, the source and spring of intellectual life; and in the works produced under its auspices we discover the rhetorician and the writer, never the man. By all its traditions the academy was made to be the natural ornament of a monarchical society. Richelieu conceived and created it as a sort of superior centralisation applied to intellect, as a high literary court to maintain intellectual unity, and protest against innovation. Bonaparte, aware of all this, had thought of re-establishing its ancient privileges; but it had in his eyes one fatal defect—*esprit*. Kings of France could condone a witticism even against themselves, a *parvenu* could not.”

In conclusion, we would briefly state our own opinion. The influence of the French Academy has been conservative rather than creative. While it has raised the general standard of writing, it has tended to hamper and crush originality. It has done much by its example for style, but its attempts to impose its laws on language have, from the nature of the case, failed. For, however perfectly a dictionary or a grammar may represent the existing language of a nation, an original genius is certain to arise—a Victor Hugo, or an Alfred de Musset, who will set at defiance all dictionaries and academic rules.

Spain.—The Royal Spanish Academy at Madrid held its first meeting in July 1713, in the palace of its founder, the Duke d’Escalona. It consisted at first of 8 academicians, including the duke; to which number 14 others were afterwards added, the founder being chosen president or director. In 1714 the king granted them the royal confirmation and protection. Their device is a crucible in

<sup>1</sup> His pension, the cardinal remarked, “Well, Monsieur, you will not forget the word *pension* in your dictionary.” “No, Monseigneur,” replied Vaugelas, “and still less the word *gratitude*.”

<sup>2</sup> Boileau was elected to the French Academy 1684, La Bruyère in 1693.

the middle of the fire, with this motto, *Limpia, fixa, y da esplendor*—"It purifies, fixes, and gives brightness." The number of its members was limited to 24; the Duke d'Escalona was chosen director for life, but his successors were elected yearly, and the secretary for life. Their object, as marked out by the royal declaration, was to cultivate and improve the national language. They were to begin with choosing carefully such words and phrases as have been used by the best Spanish writers; noting the low, barbarous, or obsolete ones; and composing a dictionary wherein these might be distinguished from the former.

*Sweden*.—The *Royal Swedish Academy* was founded in the year 1786, for the purpose of purifying and perfecting the Swedish language. A medal is struck by its direction every year in honour of some illustrious Swede. This academy does not publish its transactions.

*Belgium*.—Belgium has always been famous for its literary societies. The little town of Diest boasts that it possessed a society of poets in 1302; and the Catherinists of Alost date from 1107. Whether or not there is any foundation for these claims, it is certain that numerous *Chambers of Rhetoric* (so academies were then called) existed in the first years of the rule of the house of Burgundy.

The present *Royal Academy of Belgium* was founded by the Count of Coblenz at Brussels, 1769. Count Stahrenberg obtained for it in 1772 letters patent from Maria Theresa, who also granted pensions to all the members, and a fund for printing their works. All academicians were *ipso facto* ennobled. It was reorganised, and a class of fine arts added in 1845 through the agency of M. Van de Weyer, the learned Belgian ambassador at London. It has devoted itself principally to national history and antiquities.

### III. ACADEMIES OF ARCHEOLOGY AND HISTORY.—

*Italy*.—Under this class the *Academy of Herculaneum* properly ranks. It was established at Naples about 1755, at which period a museum was formed of the antiquities found at Herculaneum, Pompeii, and other places, by the Marquis Tanucci, who was then minister of state. Its object was to explain the paintings, &c., which were discovered at those places; and for this purpose the members met every fortnight, and at each meeting three paintings were submitted to three academicians, who made their report on them at their next sitting. The first volume of their labours appeared in 1775, and they have been continued under the title of *Antichità di Ercolano*. They contain engravings of the principal paintings, statues, bronzes, marble figures, medals, utensils, &c., with explanations. In the year 1807, an Academy of History and Antiquities, on a new plan, was established at Naples by Joseph Bonaparte. The number of members was limited to forty; twenty of whom were to be appointed by the king, and these twenty were to present to him, for his choice, three names for each of those wanted to complete the full number. Eight thousand ducats were to be annually allotted for the current expenses, and two thousand for prizes to the authors of four works which should be deemed by the academy most deserving of such a reward. A grand meeting was to be held every year, when the prizes were to be distributed, and analyses of the works read. The first meeting took place on the 25th of April 1807; but the subsequent changes in the political state of Naples prevented the full and permanent establishment of this institution. In the same year an academy was established at Florence for the illustration of Tuscan antiquities, which published some volumes of memoirs.

*France*.—The old *Academy of Inscriptions and Belles Lettres* was an off-shoot from the French Academy, which

then at least contained the *élite* of French learning. Louis XIV. was of all French kings the one most occupied with his own aggrandisement. Literature, and even science, he only encouraged so far as they redounded to his own glory. Nor were literary men inclined to assert their independence. Boileau well represented the spirit of the age when, in dedicating his tragedy of *Berenice* to Colbert, he wrote—"The least things become important if in any degree they can serve the glory and pleasure of the king." Thus it was that the Academy of Inscriptions arose. At the suggestion of Colbert, a company (a committee we should now call it) had been appointed by the king, chosen from the French Academy, charged with the office of furnishing inscriptions, devices, and legends for medals. It consisted of four academicians: Chapelain, then considered the poet laureate of France, one of the authors of the critique on the *Cid* (see above); l'abbé de Bourzeis; François Carpentier, an antiquary of high repute among his contemporaries; and l'abbé de Capagne, who owed his appointment more to the fulsome flattery of his odes than his really learned translations of Cicero and Sallust. This company used to meet in Colbert's library in the winter, at his country-house at Sceaux in the summer, generally on Wednesdays, to serve the convenience of the minister, who was constantly present. Their meetings were principally occupied with discussing the inscriptions, statues, and pictures intended for the decoration of Versailles; but M. Colbert, a really learned man and an enthusiastic collector of manuscripts, was often pleased to converse with them on matters of art, history, and antiquities. Their first published work was a collection of engravings, accompanied by descriptions, designed for some of the tapestries at Versailles. Louvois, who succeeded Colbert as a superintendent of buildings, revived the company, which had begun to relax its labours. Félibien, the learned architect, and the two great poets Racine and Boileau, were added to their number. A series of medals was commenced, entitled *Médailles de la Grande Histoire*, or, in other words, the history of le Grand Monarque.

But it was to M. de Pontchartrain, comptroller-general of finance and secretary of state, that the academy owed its institution. He added to the company Renaudot and Tourreil, both men of vast learning, the latter tutor to his son, and put at its head his nephew, l'abbé Bignon, librarian to the king. By a new regulation, dated the 16th July 1701, the *Royal Academy of Inscriptions and Medals* was instituted, being composed of ten honorary members, ten pensioners, ten associates, and ten pupils. On its constitution we need not dwell, as it was an almost exact copy of that of the Academy of Science. Among the regulations we find the following, which indicates clearly the transition from a staff of learned officials to a learned body:—"The academy shall concern itself with all that can contribute to the perfection of inscriptions and legends, of designs for such monuments and decorations as may be submitted to its judgment; also with the description of all artistic works, present and future, and the historical explanation of the subject of such works; and as the knowledge of Greek and Latin antiquities, and of these two languages, is the best guarantee for success in labours of this class, the academicians shall apply themselves to all that this division of learning includes, as one of the most worthy objects of their pursuit."

Among the first honorary members we find the indefatigable Mabillon (excluded from the pensioners by reason of his orders), Père La Chaise, the king's confessor, and Cardinal Rohan; among the associates Fontenelle, and Rollin, whose *Ancient History* was submitted to the academy for revision. In 1711 they completed *L'Histoire Métallique du Roi*, of which Saint-Simon was asked to



write the préface. In 1716 the regent changed its title to that of the *Academy of Inscriptions and Belles Lettres*, a title which better suited its new character.

In the great battle between the Ancients and the Moderns which divided the learned world in the first half of the 18th century, the Academy of Inscriptions naturally espoused the cause of the Ancients, as the Academy of Sciences did that of the Moderns. During the earlier years of the French Revolution the academy continued its labours uninterrupted; and on the 22d of January 1793, the day after the death of Louis XVI., we find in the *Proceedings* that M. Bréguigney read a paper on the projects of marriage between Queen Elizabeth and the Dukes of Anjou and Alençon. In the same year were published the 45th and 46th vols. of the *Mémoires de l'Académie*. On the 2d of August of the same year the last séance of the old academy was held. More fortunate than its sister Academy of Sciences, it lost only three of its members by the guillotine. One of these was the astronomer Sylvain Bailly. Three others sat as members of the Convention; but for the honour of the academy, we must add that all three were distinguished by their moderation.

In the first draught of the new Institute, October 25, 1795, no class corresponded exactly to the old Academy of Inscriptions; but most of the members who survived found themselves re-elected either in the 2d class of moral and political science, under which history and geography were included as sections, or more generally under the 3d class of literature and fine arts, which embraced ancient languages, antiquities, and monuments.

In 1816 the academy received again its old name. The *Proceedings* of the Society embrace a vast field, and are of very various merits. Perhaps the subjects on which it has shown most originality are comparative mythology, the history of science among the ancients, and the geography and antiquities of France. The old academy has reckoned among its members De Sacy the Orientalist, Dansse de Villosion the philologist, Du Perron the traveller, Sainte-Croix and Du Theil the antiquarians, and Le Beau, who has been named the last of the Romans. The new academy has already inscribed on its lists the well-known names of Champollion, A. Rémusat, Raynouard, Burnouf, and Augustin Thierry.

*Celtic Academy.*—In consequence of the attention of several literary men in Paris having been directed to Celtic antiquities, a *Celtic Academy* was established in that city in the year 1800. Its objects were, first, the elucidation of the history, customs, antiquities, manners, and monuments of the Celts, particularly in France; secondly, the etymology of all the European languages, by the aid of the Celtic-British, Welsh, and Erse; and, thirdly, researches relating to Druidism. The attention of the members was also particularly called to the history and settlements of the Galatæ in Asia. Lenoir, the keeper of the museum of French monuments, was appointed president. The academy still exists as *La Société Royale des Antiquaires de France*.

IV. ACADEMIES OF MEDICINE AND SURGERY.—*Germany.*—The Academy of *Natura Curiosi*, called also the *Leopoldine Academy*, was founded in 1662, by J. L. Bausch, a physician of Leipsic, who, imitating the example of the English, published a general invitation to medical men to communicate all extraordinary cases that occurred in the course of their practice. The works of the *Natura Curiosi* were at first published separately; but this being attended with considerable inconvenience, a new arrangement was formed, in 1770, for publishing a volume of observations annually. From some cause, however, the first volume did not make its appearance until 1764, when it came forth under the title of *Ephemerides*. In 1687, the Emperor

Leopold took the society under his protection, and established it at Vienna; hence the title of *Leopoldine* which it in consequence assumed. But though it thus acquired a name, it had no fixed place of meeting, and no regular assemblies; instead of which there was a kind of bureau or office, first established at Breslau, and afterwards removed to Nuremberg, where communications from correspondents were received, and persons properly qualified admitted as members. By its constitution the Leopoldine Academy consists of a president, two adjuncts or secretaries, and colleagues or members, without any limitation as to numbers. At their admission the last come under a two fold obligation—first, to choose some subject for discussion out of the animal, vegetable, or mineral kingdom, provided it has not been previously treated of by any colleague of the academy; and, secondly, to apply themselves to furnish materials for the annual *Ephemerides*. Each member also bears about with him the symbol of the academy, consisting of a gold ring, whereon is represented a book open, with an eye on one side, and on the other the academical motto of *Nunquam otiosus*.

The *Academy of Surgery* at Vienna was instituted by the present emperor, under the direction of the celebrated Brambilla. In it there were at first only two professors; and to their charge the instruction of a hundred and thirty young men was committed, thirty of whom had formerly been surgeons in the army. But latterly the number both of teachers and pupils was considerably increased. Gabrielli was appointed to teach pathology and practice; Boecking, anatomy, physiology, and physics; Streit, medical and pharmaceutical surgery; Hunczowsky, surgical operations, midwifery, and *chirurgia forensis*; and Plenk, chemistry and botany. To these was also added Beindel, as prosecutor and extraordinary professor of surgery and anatomy. Besides this, the emperor provided a large and splendid edifice in Vienna, which affords accommodation both for the teachers, the students, pregnant women, patients for clinical lectures, and servants. For the use of this academy the emperor also purchased a medical library, which is open every day; a complete set of surgical instruments; an apparatus for experiments in natural philosophy; a collection of natural history; a number of anatomical and pathological preparations; a collection of preparations in wax, brought from Florence; and a variety of other useful articles. Adjoining the building there is also a good botanical garden. With a view to encourage emulation among the students of this institution, three prize medals, each of the value of 40 florins, are annually bestowed on those who return the best answers to questions proposed the year before. These prizes, however, are not entirely founded by the emperor, but are in part owing to the liberality of Brendellius, formerly protochirurgus at Vienna.

*France.*—*Royal Academy of Medicine.*—Medicine is a science which has always engaged the attention of the kings of France. Charlemagne established a school of medicine in the Louvre, and various societies have been founded, and privileges granted to the faculty by his successors. The *Royal Academy of Medicine* succeeded to the old Royal Society of Medicine and the Academy of Surgery. It was erected by a royal ordinance, dated December 20, 1820. It was divided into three sections—medicine, surgery, and pharmacy. In its constitution it closely resembled the Academy of Sciences (*vid. sup.*). Its function was to preserve or propagate vaccine matter, and answer inquiries addressed to it by the Government on the subject of epidemics, sanitary reform, and public health generally. It has maintained an enormous correspondence in all quarters of the globe, and published extensive minutes.

V. ACADEMIES OF THE FINE ARTS.—*Russa.*—The

academy at St Petersburg was established by the Empress Elizabeth, at the suggestion of Count Shuvaloff, and annexed to the Academy of Sciences. The fund for its support was £4000 per annum, and the foundation admitted forty scholars. Catharine II. formed it into a separate institution, augmented the annual reveue to £12,000, and increased the number of scholars to three hundred; she also constructed, for the use and accommodation of the members, a large circular building, which fronts the Neva. The scholars are admitted at the age of six, and continue until they have attained that of eighteen. They are clothed, fed, and lodged at the expense of the crown; and are all instructed in reading and writing, arithmetic, the French and German languages, and drawing. At the age of fourteen they are at liberty to choose any of the following arts, divided into four classes, viz., first, painting in all its branches of history portraits, war-pieces, and landscapes, architecture, mosaic, enamelling, &c.; secondly, engraving on copperplates, seal-cutting, &c.; thirdly, carving on wood, ivory, and amber; fourthly, watch-making, turning, instrument making, casting statues in bronze and other metals, imitating gems and medals in paste and other compositions, gilding, and varnishing. Prizes are annually distributed to those who excel in any particular art; and, from those who have obtained four prizes, twelve are selected, who are sent abroad at the charge of the crown. A certain sum is paid to defray their travelling expenses; and when they are settled in any town, they receive an annual salary of £60, which is continued during four years. There is a small assortment of paintings for the use of the scholars; and those who have made great progress are permitted to copy the pictures in the imperial collection. For the purpose of design, there are models in plaster, all done at Rome, of the best antique statues in Italy, and of the same size with the originals, which the artists of the academy were employed to cast in bronze.

*France.*—The Academy of Painting and Sculpture at Paris was founded by Louis XIV. in 1648, under the title of Académie Royale des Beaux Arts, to which was afterwards united the Academy of Architecture, erected 1671. The academy is composed of painters, sculptors, architects, engravers, and musical composers. From among the members of the society, who are painters, is chosen the director of the French Académie des Beaux Arts at Berne, also instituted by Louis XIV. in 1677. The director's province is to superintend the studies of the painters, sculptors, &c., who, having been chosen by competition, are sent to Italy at the expense of the Government, to complete their studies in that country. Most of the celebrated French painters have begun their career in this way.

The *Royal Academy of Music* is the name which, by a strange perversion of language, is given in France to the grand opera. In 1571 the poet Baif established in his house an academy or school of music, at which ballets and masquerades were given. In 1645 Mazarin brought from Italy a troupe of actors, and established them in the Rue du Petit Bourbon, where they executed Jules Strozzi's "Achille in Sciro," the first opera performed in France. After Molière's death in 1673, his theatre in the Palais Royal was given to Sulli, and there were performed all Gluck's great operas; there Vestris danced, and there was produced Jean Jacques Rousseau's "Devin du Village."

*Italy.*—In 1778 an Academy of Painting and Sculpture was established at Turin. The meetings were held in the palace of the king, who distributed prizes among the most successful members. In Milan an Academy of Architecture was established so early as the year 1380, by Galeas Visconti. About the middle of the last century an Academy of the Arts was established there, after the

example of those at Paris and Rome. The pupils were furnished with originals and models, and prizes were distributed annually. The prize for painting was a gold medal, and no prize was bestowed till all the competing pieces had been subjected to the examination and criticism of competent judges. Before the effects of the French Revolution reached Italy this was one of the best establishments of the kind in that kingdom. In the hall of the academy were some admirable pieces of Correggio, as well as several ancient paintings and statues of great merit,—particularly a small bust of Vitellius, and a statue of Agrippina, of most exquisite beauty, though it wants the head and arms. The Academy of the Arts, which had been long established at Florence, fell into decay, but was restored in the end of last century. In it there are halls for nude and plaster figures, for the use of the sculptor and the painter. The hall for plaster figures had models of all the finest statues in Italy, arranged in two lines; but the treasures of this and the other institutions for the fine arts were greatly diminished during the occupancy of Italy by the French. In the saloon of the Academy of the Arts at Modena there are many casts of antique statues; but after being plundered by the French it dwindled into a petty school for drawings from living models; it contains the skull of Correggio. There is also an Academy of the Fine Arts in Mantua, and another at Venice.

*Spain.*—In Madrid an Academy for Painting, Sculpture, and Architecture, was founded by Philip V. The minister for foreign affairs is president. Prizes are distributed every three years. In Cadiz a few students are supplied by Government with the means of drawing and modelling from figures; and such as are not able to purchase the requisite instruments are provided with them.

*Sweden.*—An Academy of the Fine Arts was founded at Stockholm in the year 1733 by Count Tessin. In its hall are the ancient figures of plaster presented by Louis XIV. to Charles XI. The works of the students are publicly exhibited, and prizes are distributed annually. Such of them as display distinguished ability obtain pensions from Government, to enable them to reside in Italy for some years, for the purposes of investigation and improvement. In this academy there are nine professors, and generally about four hundred students. In the year 1705 an Academy of Painting, Sculpture, and Architecture was established at Vienna, with the view of encouraging and promoting the fine arts.

*England.*—The *Royal Academy of Arts in London* was instituted for the encouragement of designing, painting, sculpture, &c., in the year 1768, with Sir J. Reynolds for its president. This academy is under the immediate patronage of the queen, and under the direction of forty artists of the first rank in their several professions. It furnishes, in winter, living models of different characters to draw after; and in summer, models of the same kind to paint after. Nine of the ablest academicians are annually elected out of the forty, whose business it is to attend by rotation, to set the figures, to examine the performance of the students, and to give them necessary instructions. There are likewise professors of painting, sculpture, architecture, anatomy, and chemistry, who annually read public lectures on the subjects of their several departments; besides a president, a council, and other officers. The admission to this academy is free to all students properly qualified to reap advantage from the studies cultivated in it; and there is an annual exhibition at Burlington House of paintings, sculptures, and designs, open to all artists of distinguished merit.

The *Academy of Ancient Music* was established in London in 1710, by several persons of distinction, and other



amateurs, in conjunction with the most eminent masters of the time, with the view of promoting the study and practice of vocal and instrumental harmony. This institution, which had the advantage of a library, consisting of the most celebrated compositions, both foreign and domestic, in manuscript and in print, and which was aided by the performances of the gentlemen of the chapel royal, and the choir of St Paul's, with the boys belonging to each, continued to flourish for many years. In 1731 a charge of plagiarism brought against Bononcini, a member of the academy, for claiming a madrigal of Lotti of Venice as his own, threatened the existence of the institution. Dr Greene, who had introduced the madrigal into the academy, took part with Bononcini, and withdrew from the society, taking with him the boys of St Paul's. In 1734 Mr Gates, another member of the society, and master of the children of the royal chapel, also retired in disgust; so that the institution was thus deprived of the assistance which the boys afforded it in singing the soprano parts. From this time the academy became a seminary for the instruction of youth in the principles of music and the laws of harmony. Dr Pepusch, who was one of its founders, was active in accomplishing this measure; and by the expedient of educating boys for their purpose, and admitting auditor members, the subsistence of the academy was continued. The *Royal Academy of Music*

was formed by the principal nobility and gentry of the kingdom, for the performance of operas, composed by Handel, and conducted by him at the theatre in the Haymarket. The subscription amounted to £50,000, and the king, besides subscribing £1000, allowed the society to assume the title of *Royal Academy*. It consisted of a governor, deputy-governor, and twenty directors. A contest between Handel and Senesino, one of the performers, in which the directors took the part of the latter, occasioned the dissolution of the academy, after it had subsisted with reputation for more than nine years. The present *Royal Academy of Music* dates from 1822, and was incorporated in 1830 under the patronage of the queen. It instructs pupils of both sexes in music, charging 33 guineas per annum; but many receive instruction free. It also gives public concerts. In this institution the leading instrumentalists and vocalists of England have received their education. (See *Musical Directory* published by Rudall, Carte, and Co.)

ACADEMY is a term also applied to those royal collegiate seminaries in which young men are educated for the navy and army. In our country there are three colleges of this description—the Royal Naval College at Portsmouth, the Royal Military Academy at Woolwich, and the Royal Military College, Sandhurst.

F. S.

ACADIE, or ACADIA, the name borne by Nova Scotia while it remained a French settlement.

ACALEPHÆ (from ἀκαλήφη, a nettle), a name given to the animals commonly known as jelly-fish, sea-blubber, Medusæ, sea-nettles, &c.

ACANTHOCEPHALA (from ἀκανθα, a thorn, and κεφαλή, the head), a group of parasitic worms, having the heads armed with spines or hooks.

ACANTHOPTERYGII (from ἀκανθα, a thorn, and πτερυγί, a wing), an order of fishes, having bony skeletons with prickly spinous processes in the dorsal fins.

ACANTHUS, a genus of plants belonging to the natural order Acanthaceæ. The species are natives of the southern parts of Europe. The most common species is the *Acanthus mollis* or *Brankursine*. It has large, deeply-cut, hairy, shining leaves, which are supposed to have suggested the decoration of the Corinthian column. Another species, *Acanthus spinosus*, is so called from its spiny leaves.

ACAPULCO, a town and port in Mexico, on a bay of the Pacific Ocean, about 190 miles S.S.W. of Mexico, in N. lat. 16° 50', W. long. 99° 46'. The harbour, which is the best on the Pacific coast, is almost completely landlocked. It is easy of access, and the anchorage is so secure that heavily-laden ships can lie close to the rocks which surround it. The town lies N.W. of the harbour, and is defended by the castle of San Diego, which stands on an eminence. During a part of the dry season the air is infected with the putrid effluvia of a morass eastward of the town. This, together with the heat of the climate, aggravated by the reflection of the sun's rays from the granite rocks that environ the town, renders it very unhealthy, especially to Europeans, though a passage cut through the rocks, to let in the sea breeze, has tended to improve its salubrity. Acapulco was in former times the great depôt of the trade of Spain with the East Indies. A galleon sailed from this port to Manilla in the Philippine Islands, and another returned once a year laden with the treasures and luxuries of the East. On the arrival of this galleon a great fair was held, to which merchants resorted from all parts of Mexico. The trade between Acapulco

and Manilla was annihilated when Mexico became independent; and, from this cause, and also on account of the frequent earthquakes by which the town has been visited, it had sunk to comparative insignificance, when the discovery of gold in California gave it trade a fresh impetus. It is now the most important seaport in Mexico, and is regularly touched at by the Pacific mail steamers. Besides having a large transit trade, it exports wool, skins, cocoa, cochineal, and indigo; and the imports include cottons, silks, and hardware. Population about 5000.

ACARNANIA, a province of ancient Greece, now called Carnia. It was bounded on the N. by the Ambracian gulf, on the N.E. by Amphiloehia, on the W. and S.W. by the Ionian Sea, and on the E. by Ætolia. It was a hilly country, with numerous lakes and tracts of rich pasture, and its hills are to the present day crowned with thick wood. It was celebrated for its excellent breed of horses. The Acarnanians, according to Mr Grote, though admitted as Greeks to the Pan-Hellenic games, were more akin in character and manners to their barbarian neighbours of Epirus. Up to the time of the Peloponnesian war, they are mentioned only as a race of rude shepherds, divided into numerous petty tribes, and engaged in continual strife and rapine. They were, however, favourably distinguished from their Ætolian neighbours by the fidelity and steadfastness of their character. They were good soldiers, and excelled as slingers. At the date above mentioned they begin, as the allies of the Athenians, to make a more prominent figure in the history of Greece. The chief town was Stratos, and subsequently Leucas.

ACARUS (from ἀκαρε, a mite), a genus of Arachnides, represented by the cheese mite and other forms.

ACCELERATION is a term employed to denote generally the rate at which the velocity of a body, whose motion is not uniform, either increases or decreases. As the velocity is continually changing, and cannot therefore be estimated, as in uniform motion, by the space actually passed over in a certain time, its value at any instant has to be measured by the space the body would describe in the unit of time, supposing that at and from the instant in

question the motion became and continued uniform. If the motion is such that the velocity, thus measured, increases or decreases by equal amounts in equal intervals of time, it is said to be *uniformly* accelerated or retarded. In that case, if  $f$  denote the amount of increase or decrease of velocity corresponding to the unit of time, the whole of such increase or decrease in  $t$  units of time will evidently be  $ft$ , and therefore if  $u$  be the initial and  $v$  the final velocity for that interval,  $v = u \pm ft$ ,—the upper sign applying to accelerated, the lower to retarded, motion. To find the distance or space,  $s$ , gone over in  $t$  units of time, let  $t$  be divided into  $n$  equal intervals. The velocities at the end of the successive intervals will be  $u \pm f \frac{t}{n}$ ,  $u \pm f \frac{2t}{n}$ ,  $u \pm f \frac{3t}{n}$ , &c. Let it now be supposed that during each of these small intervals the body has moved uniformly with its velocity at the end of the interval, then (since a body moving uniformly for  $x$  seconds with a velocity of  $y$  feet per second will move through  $xy$  feet) the spaces described in the successive intervals would be the product of the velocities given above by  $\frac{t}{n}$ , and the whole space in the time  $t$  would be the sum of these spaces; i.e.,

$$s = u \frac{t}{n} (1 + 1 \dots \text{repeated } n \text{ times}) \pm f \frac{t^2}{n^2} (1 + 2 + 3 \dots + n) \\ = ut \pm f \frac{t^2}{n^2} \cdot \frac{n(n+1)}{2} = ut \pm \frac{1}{2} f t^2 \left(1 + \frac{1}{n}\right).$$

It is evident, however, that as the increase or decrease of velocity takes place continuously, this sum will be too large; but the greater  $n$  is taken, or (which is the same thing) the smaller the intervals are during which the velocity is supposed to be uniform, the nearer will the result be to the truth. Hence making  $n$  as large as possible, or  $\frac{1}{n}$  as small as possible, i.e.,  $= 0$ , we obtain as the

correct expression  $s = ut \pm \frac{1}{2} f t^2$ . In the case of motion from rest,  $u = 0$ , and the above formulae become  $v = ft$ ,  $s = \frac{1}{2} f t^2$ .

We have a familiar instance of uniformly accelerated and uniformly retarded motion in the case of bodies falling and rising vertically near the earth's surface, where, if the resistance of the air be neglected, the velocity of the body is increased or diminished, in consequence of the earth's attraction, by a uniform amount in each second of time. To this amount is given the name of the acceleration of gravity (usually denoted by the letter  $g$ ), the value of which, in our latitudes and at the surface of the sea, is very nearly  $32\frac{1}{2}$  feet per second. Hence the space a body falls from rest in any number of seconds is readily found by multiplying  $16\frac{1}{2}$  feet by the square of the number of seconds. For a fuller account of accelerating force, expressed in the notation of the Differential Calculus by  $f = \pm \frac{dv}{dt}$  or  $f = \pm \frac{d^2s}{dt^2}$ ,—the reader is referred to the article

#### DYNAMICS.

ACCENT, in reading or speaking, is the stress or pressure of the voice upon a *syllable* of a word. The derivation of the term (Lat. *accentus*, *quasi adcantus*) clearly shows that it was employed by the classical grammarians to express the production of a musical effect. Its origin is therefore to be sought in the natural desire of man to gratify the ear by modulated sound, and probably no language exists in which it does not play a more or less important part. "Only a machine," says Professor Blackie (*Place and Power of Accent in Language*, in the *Transactions of the Royal Society of Edinburgh*, 1871), "could

produce a continuous series of sounds in undistinguished monotonous repetitions like the *tüm, tün, tüm*, of a drum; a rational being using words for a rational purpose to manifest his thoughts and feelings, necessarily accents both words and sentences in some way or other." That the accentuation of some languages is more distinct, various, and effective than that of others is beyond question, but there are none, so far as we know, in which its power is not felt. The statement sometimes made, that the French have no accent in their words, can only mean that their accent is less emphatic or less variously so than that of certain other nations. If it means more, it is not merely an error, but an absurdity. From this conception of the subject, it is obvious that accent must be fundamentally the same thing in all languages, and must aim more or less successfully at the same results, however diverse the rules by which it is governed. But there are, nevertheless, important differences between the conditions under which accent operated in the classical, and those in which it operates in modern tongues. It did not wholly determine the rhythm, nor in the least affect the metre of classical verse; it did not fix the quantity or length of classical syllables. It was a musical element superadded to the measured structure of prose and verse.

Passing over the consideration of the accentual system of the Hebrews with the single remark, that it exhibits, though with more elaborate and complicated expression, most of the characteristics both of Greek and English accent, we find that the Greeks employed three grammatical accents, viz, the *acute accent* (´), which shows when the tone of the voice is to be raised; the *grave accent* (`), when it is to be depressed; and the *circumflex accent* (^), composed of both the acute and the grave, and pointing out a kind of undulation of the voice. The Latins have made the same use as the Greeks of these three accents, and various modern nations, French, English, &c., have also adopted them. As to the Greek accents, now seen both in manuscripts and printed books, there has been great dispute about their antiquity and use. But the following things seem to be undoubtedly taught by the ancient grammarians and rhetoricians:—(1.) That by *accent* (ᾤσσησις, τόπος) the Greeks understood the elevation or falling of the voice on a particular syllable of a word, either absolutely, or in relation to its position in a sentence, accompanied with an *intension* or *remission* of the vocal utterance on that syllable (ἐντασις, ἀνασφαλις), occasioning a marked predominance of that syllable over the other syllables of the word. The predominance thus given, however, had no effect whatever on the quantity—long or short—of the accented syllable. The accented syllable in Greek as in English, might be long or it might be short; elevation and emphasis of utterance being one thing, and prolongation of the vocal sound quite another thing, as any one acquainted with the first elements of music will at once perceive. The difficulty which many modern scholars have experienced in conceiving how a syllable could be accented and not lengthened, has arisen partly from a complete want of distinct ideas on the nature of the elements of which human speech is composed, and partly also from a vicious practice which has long prevailed in the English schools, of reading Greek, not according to the laws of its own accentuation, but according to the accent of Latin handed down to us through the Roman Catholic Church. For the rules of Latin accentuation are, as Quintilian and Cicero and the grammarians expressly mention, very different from the Greek; and the long syllable of a word has the accent in Latin in a hundred cases, where the musical habit of the Greek ear placed it upon the short. There is, besides, a vast number of words in Greek accented on the last syllable (like *volunteer*, *ambuscade*, in English), of which not a single instance occurs in the Latin lan-



gaage. Partly, however, from ignorance, partly from carelessness, and partly perhaps from stupidity, our scholars transferred the pronunciation of the more popular learned language to that which was less known; and with the help of time and constant usage, so habituated themselves to identify the accented with the long syllable, according to the analogy of the Latin, that they began seriously to doubt the possibility of pronouncing otherwise. English scholars have long ceased to recognise its existence, and persist in reading Greek as if the accentual marks meant nothing at all. Even those who allow (like Mr W. G. Clark and Professor Munro) that ancient Greek accent denoted an elevation of voice or tone, are still of opinion that it is impossible to reproduce it in modern times. "Here and there," says the former (*Cambridge Journal of Philology*, vol. i. 1868), "a person may be found with such an exquisite ear, and such plastic organs of speech, as to be able to reproduce the ancient distinction between the length and tone of syllables accented and unaccented, and many not so gifted may fancy that they reproduce it when they do nothing of the kind. For the mass of boys and men, pupils as well as teachers, the distinction is practically impossible." But, in spite of such pessimist views, it may, on the whole, be safely asserted that since the appearance of a more philosophical spirit in philology, under the guidance of Hermann, Boeckh, and other master-minds among the Germans, the best grammarians have come to recognise the importance of this element of ancient Hellenic enunciation, while not a few carry out their principles into a consistent practice. The only circumstance, indeed, that prevents our English scholars from practically recognising the element of accent in classical teaching, is the apprehension that this would interfere seriously with the practical inculcation of quantity; an apprehension in which they are certainly justified by the practice of the modern Greeks, who have given such a predominance to accent, as altogether to subordinate, and in many cases completely overwhelm quantity; and who also, in public token of this departure from the classical habit of pronunciation, regularly compose their verses with a reference to the spoken accent only, leaving the quantity—as in modern language generally—altogether to the discretion of the poet. But, as experiment will teach any one that there is no necessity whatever in the nature of the human voice for this confusion of two essentially different elements, it is not unlikely that English scholars will soon follow the example of the Germans, and read Greek prose at least systematically according to the laws of classical speech, as handed down to us by the grammarians of Alexandria and Byzantium. In the recitation of classical verse, of course, as it was not constructed on accentual principles, the skilful reader will naturally allow the musical accent, or the emphasis of the rhythm to overbear, to a great extent, or altogether to overwhelm, the accent of the individual word; though with regard to the recitation of verse, it will always remain a problem how far the ancients themselves did not achieve an "*accentuum cum quantitate apta conciliatio*," such as that which Hermann (*De emendanda ratione*, &c.) describes as the perfection of a polished classical enunciation. A historic survey of the course of learned opinion on the subject of accent, from the age of Erasmus down to the present day, forms an interesting and important part of Professor Blackie's essay quoted above. See Pennington's work on Greek Pronunciation, Cambridge, 1844; the German work on Greek Accent by Götting (English), London, 1831; and Blackie's essay on the *Place and Power of Accent*, in the *Transactions of the Royal Society of Edinburgh*, 1870-71.

If there is any perplexity regarding the nature or influence of classical accent, there is none about English. It

does not conflict or combine with the modulations of quantity. It is the sole determining element in our metrical system. "Almost the very earliest of our authors, the Venerable Bede, notices this. In defining rhythm he says—"It is a modulated composition of words, not according to the laws of metre, but adapted in the number of its syllables to the judgment of the ear, as are the *verse of our vulgar poets*" (*Bede*, *Op.* vol. i. p. 67, ed. 1553). We have, of course, long vowels and short, like the Greeks and the Romans, but we do not regulate our verse by them; and our mode of accentuation is sufficiently despotic to occasionally almost change their character, so that a long vowel shall seem short, and *vice versa*. In reality this is not so. The long vowel remains long, but then its length gives it no privilege of place in a verse. It may modify the enunciation, it may increase the roll of sound, but a short vowel could take its place without a violation of metre. Take the word *far*, for example; there the vowel *a* is long, yet in the line

"O Moon, far-spooming Ocean bows to thee

it is not necessary that the *a* in *far* should be long; a short vowel would do as well for metrical purposes, and would even bring out more distinctively the accentuation of the syllable *spoom*.

Originally English accent was upon the root, and not upon inflectional syllables. Götting finds the same principle operating in Greek, but in that language it certainly never exercised the universal sway it does in the earlier forms of English. In the following passage from *Beowulf*, the oldest monument of English literature, belonging, in its first form, to a period even anterior to the invasion of Britain by the Angles and Saxons, we shall put the accented or emphatic syllables in italics:—

|                                                    |                                     |
|----------------------------------------------------|-------------------------------------|
| <i>Stræt</i> wæs <i>stán-fah</i> . . .             | The street was of variegated stone, |
| <i>stíg</i> wísdæ . . .                            | the path directed                   |
| <i>gumum</i> aet- <i>gædere</i> . . .              | the men together;                   |
| <i>ýdél</i> -byrne scán . . .                      | the war-corselet shon               |
| <i>heard</i> , <i>hond</i> -locen . . .            | hard, hand-locked;                  |
| <i>hring</i> -iren <i>geir</i> . . .               | the ring-iron bright                |
| <i>song</i> in <i>searwum</i> . . .                | sang in their trappings,            |
| <i>pá</i> hie <i>tó sele</i> <i>furdum</i> . . .   | when they to the hall forward       |
| in <i>hyra</i> <i>gryfe</i> - <i>geatwum</i> . . . | in their terrible armour            |
| <i>gangan</i> <i>cwomon</i> . . .                  | came to go.                         |

It will be observed that in these verses the accent (not to be confounded with the mark which is used in Anglo-Saxon to show that the vowel over which it is placed is long) is invariably on a monosyllable, or on the root part of a word of more than one syllable. The passage is also a good illustration of what has previously been stated, that the metre or rhythm in English is determined not by the vowel-quantity of a syllable, but by the stress of the voice on particular syllables, whether the vowels are long or short. In the older forms of English verse the accent is somewhat irregular; or, to put it more accurately, the number of syllables intervening between the recurrent accents is not definitely fixed. Sometimes two or more intervene, sometimes none at all. Take, for example, the opening lines of Langland's poem, entitled the *Vision of Piers the Plowman*:—

"In a somer sason  
Whan soft was the sonne,  
I shope me in shroudes,  
As I a shope were,  
In habit as an heremite  
Unholy of workes,  
Went wide in this world  
Wonders to here.  
As on a May mornynge  
On Malverne hilles,

Me byfel a ferly,  
Of fairy, me thoughts;  
I was wery forwardred,  
And went me to reste  
Under a brode banke  
By a bornes side.  
And as I lay and lomed,  
And loked in the waters,  
I slombrid in a slepyng,  
It sweyved so merye."

But no matter how irregular the time elapsing between the

recurrence of the accents, they are always on the root-syllables.

The Norman Conquest, however, introduced a different system, which gradually modified the rigid uniformity of the native English accentuation. The change is visible as early as the end of the 12th century. By the middle of the 14th, that is to say, in the age of Chaucer, it is in full operation. Its origin is thus explained by Mr Marsh, in his *Origin and History of the English Language* (Lond., 1862):—"The vocabulary of the French language is derived, to a great extent, from Latin words deprived of their terminal inflections. The French adjectives *mortal* and *fatal* are formed from the Latin *mortalis* and *fatalis*, by dropping the inflected syllable; the French nouns *nation* and *condition* from the Latin accusatives *nationem*, *conditionem*, by rejecting the *em* final. In most cases, the last syllable retained in the French derivatives was prosodically long in the Latin original; and either because it was also accented, or because the slight accent which is perceivable in the French articulation represents temporal length, the stress of the voice was laid on the final syllable of all these words. When we borrowed such words from the French we took them with their native accentuation; and as accent is much stronger in English than in French, the final syllable was doubtless more forcibly enunciated in the former than in the latter language." The new mode of accentuation soon began to affect even words of pure English origin—e.g., in *Robert of Gloucester* we find *falshe* instead of *falshe*, *tidinge* instead of *tidinge*, *trewhe* instead of *trewhe*, *gladdore* instead of *gladdore*, *wisliche* instead of *wisliche*, *begynnyng* instead of *begynnyng*, *endyn* instead of *endyn*. In the *Proverbs of Hendyng* we have *nothyng* for *nothyng*, *habben* for *habben*, *fomon* for *fomon*; in *Robert of Brunne*, *halydom* for *halydom*, *clothyng* for *clothyng*, *gretand* for *gretand*. Chaucer furnishes numerous instances of the same foreign influence revolutionising the native accent; *freedom* for *freedom*, *hethenesse* for *hethenesse*, *worthinesse* for *worthinesse*, *lowly* for *lowly*, *wynnyng* for *wynnyng*, *weddyng* for *weddyng*, *comynge* for *comynge*; and it is traceable even in Spenser. On the other hand, a contrary tendency must not be overlooked. We see an effort, probably unconscious, to compel words of French origin to submit to the rule of English accentuation. It is noticeable in the century before Chaucer: in Chaucer himself it begins to work strongly; *mortal* becomes *mortal*; *tempest*, *tempest*; *substance*, *substance*; *amiable*, *amiable*; *morsel*, *morsel*; *service*, *service*; *duchesse*, *duchesse*; *cosyn*, *cosyn*, &c.; while a multitude of words oscillate between the rival modes of accentuation, now following the French and now the English. Before and during the Elizabethan period, the latter began to prove the stronger, and for the last 300 years it may be said to have, for the most part, Anglicised the accent and the nature of the foreign additions to our vocabulary. Nevertheless, many French words still retain their own accent. Morris (*Historical Outlines of English Accidence*, p. 75) thus classifies these:—

"(1.) Nouns in *-ade*, *-ier* (*-eer*), *-é*, *-ee*, or *-oon*, *-ine*, (*-in*), as *cadet*, *crusade*, &c.; *cavalier*, *chandelier*, &c.; *gaveller*, *pioneer*, &c. (in conformity with these we say *harpioneer*, *mountaineer*); *legat*, *payee*, &c.; *balloon*, *cartoon*, &c.; *chagrin*, *violin*, &c.; *routine*, *marine*, &c.

"Also the following words:—*cadet*, *brunette*, *gazelle*, *cravat*, *canal*, *control*, *gazelle*, *amateur*, *fatigue*, *antique*, *police*, &c.

"(2.) Adjectives (*a*) from Lat. adj. in *us*, as *august*, *benign*, *robust*, &c.; (*b*) in *-ose*, as *morose*, *verbose*, &c.; (*c*) *-esque*, as *burlesque*, *grotesque*, &c.

"(3.) Some verbs, as *baptize*, *cajole*, *caress*, *carouse*, *chastise*, *escape*, *esteem*, &c.

To these may be added the Greek and Latin words which have been introduced into English for scientific and other learned purposes, and which, not having been altered in form, retain their original accentuation—as *auro-ra*,

*coro-na*, *colo-ris*, *idé-a*, *hypoth-esis*, *cæsu-ra*, *diæ-resis*, *diag-no-sis*, *dilu-vium*, *diplo-ma*, *efflu-vium*, *elys-ium*, &c.; besides the still larger number that have suffered a slight modification of form, but no change of accent, as *dialectic*, *diagnostic*, *efflorescent*, *elliptic*, *emersion*, *emolument*, &c. The Italian contributions to our tongue retain their original accent when the form is untouched, as *mulat-to*, *sonat-a*, *volcan-o*, but lose it when the form is shortened, as *bandit* (*It. bandi-to*).

A change in the position of the accent serves a variety of purposes in English. It distinguishes (1.) a *noun* from a *verb*, as *ac-cent*, *accent*; *aug-ment*, *augment*; *torment*, *torm-ent*; *com-ment*, *comment*; *con-sort*, *consort*; *con-test*, *cont-est*; *con-trast*, *contrast*; *di-gest*, *digest*; *dis-count*, *dis-count*; *in-sult*, *insult*, &c.; (2.) an *adjective* from a *verb*, as *ab-sent*, *absent*; *fre-quent*, *frequent*; *pre-sent*, *present*; *com-pound*, *compound*, &c.; (3.) an *adjective* from a *noun*, as *ex-pert*, *expert*; *com-compact*, *compact*. It also denotes a difference of meaning, e.g., *con-jure*, *conjure*; *in-cense*, *incense*; *au-gust*, *august*; *su-pine*, *supine*.

Accent has exercised a powerful influence in changing the forms of words. The unaccented syllables in the course of time frequently dropped off. This process was necessarily more rapid and thorough in English than in many other languages which were not subjected to equal strain. The Norman Conquest made havoc of the English tongue for a time. It was expelled from the court, the schools, the church, and the tribunals of justice; it ceased to be spoken by priests, lawyers, and nobles; its only guardians were churls, ignorant, illiterate, indifferent to grammar, and careless of diction. Who can wonder if, in circumstances like these, it suffered disastrous eclipse? The latter part of the Anglo-Saxon Chronicle furnishes melancholy evidence of the chaos into which it had fallen, yet out of this chaos it rose again into newness of life, reforming and re-accenting its half-ruined vocabulary, and drawing from the very agent of its destruction the elements of a richer and more plastic expression. For it cannot be doubted that the irregularities now existing in English accent, though perplexing to a foreigner, copiously vary the modulation, and so increase the flexibility and power of the language. The older forms of English, those in use before the Conquest, and down to the period of Chaucer, are stiff, monotonous, and unmusical. A hard strength is in the verse, but no liquid sweetness or nimble grace. Now, it is possible, in spite of our deficiency in vowel endings, to produce the noblest melody in accent words known to the modern world. Almost every kind of metre, swift or slow, airy or majestic, has been successfully attempted since the age of the *Canterbury Tales*. When we compare the drone of Caedmon with the aerial melody of the *Skylark*, the *Cloud*, and the *Arethusa* of Shelley, we see what an infinite progress has been made by the development of accent in the rhythm of our native tongue.

See *Lectures on the English Language*, by G. P. Marsh (Lond. 1861); the *Origin and History of the English Language*, &c., by G. P. Marsh (Lond. 1862); *Historische Grammatik der Englische Sprache*, von C. Friedrich Koch (1863-69); *The English Language*, by R. G. Latham (1855); *Philological Essays*, by the Rev. Richard Garnett (Lond. 1859); *On Early English Pronunciation, with especial reference to Shakspeare and Chaucer*, by A. J. Ellis (Lond. 1867-71); *Historical Outlines of English Accidence*, by Dr R. Morris (Lond. 1872).

(J. M. R.)

ACCEPTANCE is the act by which a person binds himself to comply with the request contained in a bill of exchange addressed to him by the drawer. In all cases it is understood to be a promise to pay the bill in money, the law not recognising an acceptance in which the promise is



to pay in some other way, as, for example, partly in money and partly by another bill. Acceptance may be absolute, conditional, or partial. *Absolute* acceptance is an engagement to pay the bill strictly according to its tenor, and is made by the drawee subscribing his name, with or without the word "accepted," at the bottom of the bill, or across the face of it. *Conditional* acceptance is a promise to pay on a contingency occurring, as, for example, on the sale of certain goods consigned by the drawer to the acceptor. No contingency is allowed to be mentioned in the body of the bill, but a contingent acceptance is quite legal, and equally binding with an absolute acceptance upon the acceptor when the contingency has occurred. *Partial* acceptance is where the promise is to pay only part of the sum mentioned in the bill, or to pay at a different time or place from those specified. In all cases acceptance involves the signature of the acceptor either by himself or by some person duly authorised on his behalf. A bill can be accepted in the first instance only by the person or persons to whom it is addressed; but if he or they fail to do so, it may, after being protested for non-acceptance, be accepted by another "*supra* protest," for the sake of the honour of one or more of the parties concerned in it.

**ACCESSION** is applied, in a historical or constitutional sense, to the coming to the throne of a dynasty or line of sovereigns, as the accession of the House of Hanover. The corresponding term, when a single sovereign is spoken of, is "succession." In law, accession is a method of acquiring property, by which, in things that have a close connection with or dependence on one another, the property of the principal draws after it the property of the accessory, according to the principle, *accessio cedet principali, or accessorium sequitur principale*. Thus, the owner of a cow becomes likewise the owner of the calf, and a landowner becomes proprietor of what is added to his estate by alluvion. Accession produced by the art or industry of man has been called industrial accession, and may be by specification, as when wine is made out of grapes, or by confusion or commixture. Accession sometimes likewise signifies consent or acquiescence. Thus, in the bankrupt law of Scotland, when there is a settlement by a trust-deed, it is accepted on the part of each creditor by a deed of accession.

**ACCESSORY**, a person guilty of a felonious offence, not as principal, but by participation; as by advice, command, aid, or concealment. In treason, accessories are excluded, every individual concerned being considered as a principal. In crimes under the degree of felony, also, all persons concerned, if guilty at all, are regarded as principals. (See 24 and 25 Vict. c. 94. s. 8.) There are two kinds of accessories—*before* the fact, and *after* it. The first is he who commands or procures another to commit felony, and is not present himself; for if he be present, he is a principal. The second is he who receives, assists, or comforts any man that has done murder or felony, whereof he has knowledge. An accessory before the fact is liable to the same punishment as the principal; and there is now indeed no practical difference between such an accessory and a principal in regard either to indictment, trial, or punishment (24 and 25 Vict. c. 94). Accessories after the fact are in general punishable with imprisonment for a period not exceeding two years (*ib.* s. 4). The law of Scotland makes no distinction between the accessory to any crime (called *art* and *part*) and the principal. Except in the case of treason, accession after the fact is not noticed by the law of Scotland, unless as an element of evidence to prove previous accession.

**ACCIAJUOLI, DONATO**, was born at Florence in 1428. He was famous for his learning, especially in Greek and mathematics, and for his services to his native state. Having previously been intrusted with several important

embassies, he became Gonfalonier of Florence in 1473. He died at Milan in 1478, when on his way to Paris to ask the aid of Louis XI. on behalf of the Florentines against Pope Sixtus IV. His body was taken back to Florence, and buried in the church of the Carthusians at the public expense, and his daughters were portioned by his fellow-citizens, the fortune he left being, owing to his probity and disinterestedness, very small. He wrote a Latin translation of some of Plutarch's *Lives* (Florence, 1478); *Commentaries* on Aristotle's *Ethics* and *Politics*; and the *Lives* of Hannibal, Scipio, and Charlemagne. In the work on Aristotle he had the co-operation of his master Argyropylus.

**ACCIDENT.** An attribute of a thing or class of things, which neither belongs to, nor is in any way deducible from, the essence of that thing or class, is termed its *accident*. An accident may be either inseparable or separable: the former, when we can conceive it to be absent from that with which it is found, although it is always, as far as we know, present, *i.e.*, when it is not necessarily but is universally present; the latter, when it is neither necessarily nor universally present. It is often difficult to determine whether a particular attribute is essential or accidental to the object we are investigating, subsequent research frequently proving that what we have described as accidental ought to be classed as essential, and *vice versa*. Practically, and for the time being, an attribute, which neither directly nor indirectly forms part of the signification of the term used to designate the object, may be considered an accident; and many philosophers look upon this as the only intelligible ground for the distinction. Propositions expressing the relation between a thing or class and an accident, and also between a thing or class and its property (*i.e.*, something deducible from, but not strictly forming part of, its essence), are variously styled "accidental," "synthetical," "real," "ampliative," in contradistinction to "essential," "analytical," "verbal," and "explicative" propositions. The former give us information that we could not have discovered from an analysis of the subject notion—*e.g.*, "man is found in New Zealand," the latter merely state what we already know, if we understand the meaning of the language employed, *e.g.*, "man is rational."

**ACCIUS**, a poet of the 16th century, to whom is attributed *A Paraphrase of Esop's Fables*, of which Julius Scaliger speaks with great praise.

**ACCIUS** (or **ARRIUS**), **LUCRUS**, a Latin tragic poet, was the son of a freedman, born, according to St Jerome, in the year of Rome 583, though this appears somewhat uncertain. He made himself known before the death of Pacuvius by a dramatic piece, which he exhibited the same year that Pacuvius brought one on the stage, the latter being then eighty years of age, and Accius only thirty. We do not know the name of this piece of Accius's, but the titles of several of his tragedies are mentioned by various authors. He wrote on the most celebrated stories which had been represented on the Athenian stage; but he did not always take his subject from Grecian story; for he composed at least one dramatic piece wholly Roman, entitled *Brutus*, and referring to the expulsion of the Tarquins. Only fragments of his tragedies remain. He did not confine himself to dramatic writing, having left other productions, particularly his *Annals*, mentioned by Macrobius, Priscian, Festus, and Nonnius Marcellus. He has been censured for the harshness of his style, but in other respects he has been esteemed a great poet. He died at an advanced age; and Cicero, who evidently attaches considerable weight to his opinions, speaks of having conversed with him in his youth.

**ACCLAMATION**, the expression of the opinion, favourable or unfavourable, of any assembly by means of the voice. *Applause* denotes strictly a similar expression by

clapping of hands. but this distinction in the usage of the words is by no means uniformly maintained. Among the Romans acclamation was varied both in form and purpose. At marriages it was usual for the spectators to shout *To Hymen, Hymenee, or Talassio*; a victorious army or general was greeted with *To triumphe*; in the theatre acclamation was called for at the close of the play by the last actor, who said, *Plaudite*; in the senate opinions were expressed and votes passed by acclamation in such forms as *Omnes, omnes, Equum est, Justum est, &c*; and the praises of the emperor were celebrated in certain pre-arranged sentences, which seem to have been chanted by the whole body of senators. The acclamations which authors and poets who recited their works in public received were at first spontaneous and genuine, but in time became very largely mercenary, it being customary for men of fortune who affected literary tastes to keep applauders in their service and lend them to their friends. When Nero performed in the theatre his praises were chanted, at a given signal, by five thousand soldiers, who were called *Augustals*. The whole was conducted by a music-master, *mesochorus* or *pausarius*. It was this case of Nero which, occurring to the recollection of the French poet Dorat, may be said to have originated the well-known Paris *claque*. Buying up a number of the tickets for a performance of one of his plays, he distributed them gratuitously to those who promised to express approbation. From that time the *claque*, or organised body of professional applauders, has been a recognised institution in connection with the theatres of Paris. In the early ages of the Christian church it was by no means uncommon for an audience to express their approbation of a favourite preacher during the course of his sermon. Chrysostom especially was very frequently interrupted both by applause and by acclamations. In ecclesiastical councils vote by acclamation is very common, the question being usually put in the form, *placet* or *non placet*. This differs from the acclamation with which in other assemblies a motion is said to be carried, when, no amendment being proposed, approval is expressed by shouting such words as *Aye* or *Agreed*.

ACCLIMATISATION is the process of adaptation by which animals and plants are gradually rendered capable of surviving and flourishing in countries remote from their original habitats, or under meteorological conditions different from those which they have usually to endure, and which are at first injurious to them.

The subject of acclimatisation is very little understood, and some writers have even denied that it can ever take place. It is often confounded with *domestication* or with *naturalisation*; but these are both very different phenomena. A *domesticated* animal or a cultivated plant need not necessarily be *acclimatised*; that is, it need not be capable of enduring the severity of the seasons without protection. The canary bird is *domesticated* but not *acclimatised*, and many of our most extensively cultivated plants are in the same category. A *naturalised* animal or plant, on the other hand, must be able to withstand all the vicissitudes of the seasons in its new home, and it may therefore be thought that it must have become *acclimatised*. But in many, perhaps most cases of *naturalisation*, there is no evidence of a gradual adaptation to new conditions which were at first injurious, and this is essential to the idea of *acclimatisation*. On the contrary, many species, in a new country and under somewhat different climatic conditions, seem to find a more congenial abode than in their native land, and at once flourish and increase in it to such an extent as often to exterminate the indigenous inhabitants. Thus Agassiz (in his work on Lake Superior) tells us that the road-side weeds on the north-eastern United States, to the number of 130 species, are all European, the native weeds having dis-

appeared westwards; while in New Zealand there are, according to Mr T. Kirk (*Transactions of the New Zealand Institute*, vol. ii. p. 131), no less than 250 species of naturalised plants, more than 100 of which spread widely over the country, and often displace the native vegetation. Among animals, the European rat, goat, and pig, are naturalised in New Zealand, where they multiply to such an extent as to injure and probably exterminate many native productions. In neither of these cases is there any indication that *acclimatisation* was necessary or ever took place.

On the other hand, the fact that an animal or plant cannot be *naturalised* is no proof that it is not *acclimatised*. It has been shown by Mr Darwin that, in the case of most animals and plants in a state of nature, the competition of other organisms is a far more efficient agency in limiting their distribution than the mere influence of climate. We have a proof of this in the fact that so few, comparatively, of our perfectly hardy garden plants ever run wild; and even the most persevering attempts to naturalise them usually fail. Alphonse de Candolle (*Géographie Botanique*, p. 798) informs us that several botanists of Paris, Geneva, and especially of Montpellier, have sown the seeds of many hundreds of species of exotic hardy plants, in what appeared to be the most favourable situations, but that in hardly a single case has any one of them become naturalised. Attempts have also been made to naturalise continental insects in this country, in places where the proper food-plants abound and the conditions seem generally favourable, but in no case do they seem to have succeeded. Even a plant like the potato, so largely cultivated and so perfectly hardy, has not established itself in a wild state in any part of Europe.

*Different Degrees of Climatal Adaptation in Animals and Plants.*—Plants differ greatly from animals in the closeness of their adaptation to meteorological conditions. Not only will most tropical plants refuse to live in a temperate climate, but many species are seriously injured by removal a few degrees of latitude beyond their natural limits. This is probably due to the fact, established by the experiments of M. Becquerel, that plants possess no proper temperature, but are wholly dependent on that of the surrounding medium.

Animals, especially the higher forms, are much less sensitive to change of temperature, as shown by the extensive range from north to south of many species. Thus, the tiger ranges from the equator to northern Asia as far as the river Amour, and to the isothermal of 32° Fahr. The mountain sparrow (*Passer montana*) is abundant in Java and Singapore in a uniform equatorial climate, and also inhabits this country and a considerable portion of northern Europe. It is true that most terrestrial animals are restricted to countries not possessing a great range of temperature or very diversified climates, but there is reason to believe that this is due to quite a different set of causes, such as the presence of enemies or deficiency of appropriate food. When supplied with food and partially protected from enemies, they often show a wonderful capacity of enduring climates very different from that in which they originally flourished. Thus, the horse and the domestic fowl, both natives of very warm countries, flourish without special protection in almost every inhabited portion of the globe. The parrot tribe form one of the most pre-eminently tropical groups of birds, only a few species extending into the warmer temperate regions; yet even the most exclusively tropical genera are by no means delicate birds as regards climate. In the *Annals and Magazine of Natural History* for 1868 (p. 381) is a most interesting account, by Mr Charles Buxton, M.P., of the naturalisation of parrots at Northrops Hall, Norfolk. A considerable number of



African and Amazonian parrots, Bengal parrots, four species of white and rose crested cockatoos, and two species of crimson lorries, have been at large for many years. Several of these birds have been bred, and they almost all live in the woods the whole year through, refusing to take shelter in a house constructed for their use. Even when the thermometer fell 6° below zero, all appeared in good spirits and vigorous health. Some of these birds have lived thus exposed for nearly twenty years, enduring our cold easterly winds, rain, hail, and snow, all through the winter,—a marvellous contrast to the equable equatorial temperature (hardly ever less than 70°) which many of them had been accustomed to for the first year or years of their existence.

Mr Jenner Weir records somewhat similar facts in the *Zoologist* for 1865 (p. 9411). He keeps many small birds in an open aviary in his garden at Blackheath, and among these are the Java rice bird (*Padda oryzivora*), two West African weaver birds (*Hyphantornis tector* and *Euplectes sanguinolentus*), and the blue bird of the southern United States (*Syris cyanea*). These denizens of the tropics prove quite as hardy as our native birds, having lived during the severest winters without the slightest protection against the cold, even when their drinking water had to be repeatedly melted.

Hardly any group of Mammalia is more exclusively tropical than the Quadrumana, yet there is reason to believe that, if other conditions are favourable, some of them can withstand a considerable degree of cold. The *Semnopithecus schistaceus* was found by Captain Hutton at an elevation of 11,000 feet in the Himalayas, leaping actively among fir-trees whose branches were laden with snow-wreaths. In Abyssinia a troop of dog-faced baboons were observed by Mr Blandford at 9000 feet above the sea. We may therefore conclude that the restriction of the monkey tribe to warm latitudes is probably determined by other causes than temperature alone.

Similar indications are given by the fact of closely allied species inhabiting very extreme climates. The recently extinct Siberian mammoth and woolly rhinoceros were closely allied to species now inhabiting tropical regions exclusively. Wolves and foxes are found alike in the coldest and hottest parts of the earth, as are closely allied species of falcons, owls, sparrows, and numerous genera of waders and aquatic birds.

A consideration of these and many analogous facts might induce us to suppose that, among the higher animals at least, there is little constitutional adaptation to climate, and that in their case acclimatisation is not required. But there are numerous examples of domestic animals which show that such adaptation does exist in other cases. The yak of Thibet cannot long survive in the plains of India, or even on the hills below a certain altitude; and that this is due to climate, and not to the increased density of the atmosphere, is shown by the fact that the same animal appears to thrive well in Europe, and even breeds there readily. The Newfoundland dog will not live in India, and the Spanish breed of fowls in this country suffer more from frost than most others. When we get lower in the scale the adaptation is often more marked. Snakes, which are so abundant in warm countries, diminish rapidly as we go north, and wholly cease at lat. 62°. Most insects are also very susceptible to cold, and seem to be adapted to very narrow limits of temperature.

From the foregoing facts and observations we may conclude, firstly, that some plants and many animals are not constitutionally adapted to the climate of their native country only, but are capable of enduring and flourishing under a more or less extensive range of temperature and other climatic conditions; and, secondly, that most plants

and some animals are, more or less closely, adapted to climates similar to those of their native habitats. In order to domesticate or naturalise the former class in countries not extremely differing from that from which the species was brought, it will not be necessary to acclimatise, in the strict sense of the word. In the case of the latter class, however, acclimatisation is a necessary preliminary to naturalisation, and in many cases to useful domestication, and we have therefore to inquire whether it is possible.

*Acclimatisation by Individual Adaptation.*—It is evident that acclimatisation may occur (if it occurs at all) in two ways, either by modifying the constitution of the individual submitted to the new conditions, or by the production of offspring which may be better adapted to those conditions than their parents. The alteration of the constitution of individuals in this direction is not easy to detect, and its possibility has been denied by many writers. Mr Darwin believes, however, that there are indications that it occasionally occurs in plants, where it can be best observed, owing to the circumstance that, so many plants are propagated by cuttings or buds, which really continue the existence of the same individual almost indefinitely. He adduces the example of vines taken to the West Indies from Madeira, which have been found to succeed better than those taken directly from France. But in most cases habit, however prolonged, appears to have little effect on the constitution of the individual, and the fact has no doubt led to the opinion that acclimatisation is impossible. There is indeed little or no evidence to show that any animal to which a new climate is at first prejudicial can be so acclimatised by habit that, after subjection to it for a few or many seasons, it may live as healthily and with as little care as in its native country; yet we may, on general principles, believe that under proper conditions such acclimatisation would take place. In his *Principles of Biology* (chap. v.), Mr Herbert Spencer has shown that every organ and every function of living beings undergoes modification to a limited extent under the stimulus of any new conditions, and that the modification is almost always such as to produce an adaptation to those conditions. We may feel pretty sure, therefore, that if robust and healthy individuals are chosen for the experiment, and if the change they are subjected to is not too great, a real individual adaptation to the new conditions—that is, a more or less complete acclimatisation—will be brought about. If now animals thus modified are bred from, we know that their descendants will inherit the modification. They will thus start more favourably, and being subject to the influence of the same or a slightly more extreme climate during their whole lives, the acclimatisation will be carried a step further; and there seems no reason to doubt that, by this process alone, if cautiously and patiently carried out, most animals which breed freely in confinement could in time be acclimatised in almost any inhabited country. There is, however, a much more potent agent, which renders the process of adaptation almost a certainty.

*Acclimatisation by Variation.*—A mass of evidence exists showing that variations of every conceivable kind occur among the offspring of all plants and animals, and that, in particular, constitutional variations are by no means uncommon. Among cultivated plants, for example, hardier and more tender varieties often arise. The following cases are given by Mr Darwin:—Among the numerous fruit-trees raised in North America, some are well adapted to the climate of the Northern States and Canada, while others only succeed well in the Southern States. Adaptation of this kind is sometimes very close, so that, for example, few English varieties of wheat will thrive in Scotland. Seed-wheat from India produced a miserable crop when planted

by the Rev. M. J. Berkeley on land which would have produced a good crop of English wheat. Conversely, French wheat taken to the West Indies produced only barren spikes, while native wheat by its side yielded an enormous harvest. Tobacco in Sweden, raised from home-grown seed, ripens its seeds a month earlier than plants grown from foreign seed. In Italy, as long as orange trees were propagated by grafts, they were tender; but after many of the trees were destroyed by the severe frosts of 1709 and 1763, plants were raised from seed, and these were found to be hardier and more productive than the former kinds. Where plants are raised from seed in large quantities, varieties always occur differing in constitution, as well as others differing in form or colour; but the former cannot be perceived by us unless marked out by their behaviour under exceptional conditions, as in the following cases. After the severe winter of 1860-61, it was observed that in a large bed of araucarias some plants stood quite unhurt among numbers killed around them. In Mr Darwin's garden two rows of scarlet runners were entirely killed by frost, except three plants, which had not even the tips of their leaves browned. A very excellent example is to be found in Chinese history, according to M. Huc, who, in his *L'Empire Chinois* (tom. ii. p. 359), gives the following extract from the *Memoirs of the Emperor Khang*:—"On the 1st day of the 6th moon I was walking in some fields where rice had been sown to be ready for the harvest in the 9th moon. I observed by chance a stalk of rice which was already in ear. It was higher than all the rest, and was ripe enough to be gathered. I ordered it to be brought to me. The grain was very fine and well grown, which gave me the idea to keep it for a trial, and see if the following year it would preserve its precocity. It did so. All the stalks which came from it showed ear before the usual time, and were ripe in the 6th moon. Each year has multiplied the produce of the preceding, and for thirty years it is this rice which has been served at my table. The grain is elongate, and of a reddish colour, but it has a sweet smell and very pleasant taste. It is called *Yu-mi*, Imperial rice, because it was first cultivated in my gardens. It is the only sort which can ripen north of the great wall, where the winter ends late and begins very early; but in the southern provinces, where the climate is milder and the land more fertile, two harvests a year may be easily obtained, and it is for me a sweet reflection to have procured this advantage for my people." M. Huc adds his testimony that this kind of rice flourishes in Mandchuria, where no other will grow. We have here, therefore, a perfect example of acclimatisation by means of a spontaneous constitutional variation.

That this kind of adaptation may be carried on step by step to more and more extreme climates is illustrated by the following examples. Sweet-peas raised in Calcutta from seed imported from England rarely blossom, and never yield seed; plants from French seed flower better, but are still sterile; but those raised from Darjeeling seed (originally imported from England) both flower and seed profusely. The peach is believed to have been tender, and to have ripened its fruit with difficulty, when first introduced into Greece; so that (as Darwin observes) in travelling northward during two thousand years it must have become much harder. Dr Hooker ascertained the average vertical range of flowering plants in the Himalayas to be 4000 feet, while in some cases it extended to 8000 feet. The same species can thus endure a great difference of temperature; but the important fact is, that the individuals have become acclimatised to the altitude at which they grow, so that seeds gathered near the upper limit of the range of a species will be more hardy than those gathered near the lower limit. This was proved by Dr Hooker to be the case with

Himalayan conifers and rhododendrons, raised in this country from seed gathered at different altitudes.

Among animals exactly analogous facts occur. M. Roulin states that when geese were first introduced into Bogota they laid few eggs at long intervals, and few of the young survived. By degrees the fecundity improved, and in about twenty years became equal to what it is in Europe. The same author tells us that, according to Garcilaso, when fowls were first introduced into Peru they were not fertile, whereas now they are as much so as in Europe. Mr Darwin adduces the following examples. Merino sheep bred at the Cape of Good Hope have been found far better adapted for India than those imported from England; and while the Chinese variety of the *Ailanthus* silk-moth is quite hardy, the variety found in Bengal will only flourish in warm latitudes. Mr Darwin also calls attention to the circumstance that writers of agricultural works generally recommend that animals should be removed from one district to another as little as possible. This advice occurs even in classical and Chinese agricultural books as well as in those of our own day, and proves that the close adaptation of each variety or breed to the country in which it originated has always been recognised.

*Constitutional Adaptation often accompanied by External Modification.*—Although in some cases no perceptible alteration of form or structure occurs when constitutional adaptation to climate has taken place, in others it is very marked. Mr Darwin has collected a large number of cases in his *Animals and Plants under Domestication* (vol. ii. p. 277), of which the following are a few of the most remarkable. Dr Falconer observed that several trees, natives of cooler climates, assumed a pyramidal or fastigiate form when grown in the plains of India; cabbages rarely produce heads in hot climates; the quality of the wood, the medicinal products, the odour and colour of the flowers, all change in many cases when plants of one country are grown in another. One of the most curious observations is that of Mr Meehan, who "compared twenty-nine kinds of American trees belonging to various orders, with their nearest European allies, all grown in close proximity in the same garden, and under as nearly as possible the same conditions. In the American species Mr Meehan finds, with the rarest exceptions, that the leaves fall earlier in the season, and assume before falling a brighter tint; that they are less deeply toothed or serrated; that the buds are smaller; that the trees are more diffuse in growth, and have fewer branchlets; and, lastly, that the seeds are smaller;—all in comparison with the European species." Mr Darwin concludes that there is no way of accounting for these uniform differences in the two series of trees than by the long-continued action of the different climates of the two continents.

In animals equally remarkable changes occur. In Angora, not only goats, but shepherd-dogs and cats, have fine fleecy hair; the wool of sheep changes its character in the West Indies in three generations; M. Costa states that young oysters, taken from the coast of England, and placed in the Mediterranean, at once altered their manner of growth and formed prominent diverging rays, like those on the shells of the proper Mediterranean oyster.

In his *Contributions to the Theory of Natural Selection* (p. 167), Mr Wallace has recorded cases of simultaneous variation among insects, apparently due to climate or other strictly local causes. He finds that the butterflies of the family *Papilionida*, and some others, become similarly modified in different islands and groups of islands. Thus, the species inhabiting Sumatra, Java, and Borneo, are almost always much smaller than the closely allied species of Celebes and the Moluccas; the species or varieties of the small island of Amboyna are larger than the same



species or closely allied forms inhabiting the surrounding islands; the species found in Celebes possess a peculiar form of wing, quite distinct from that of the same or closely allied species of adjacent islands; and, lastly, numerous species which have tailed wings in India and the western islands of the Archipelago, gradually lose the tail as we proceed eastward to New Guinea and the Pacific.

Many of these curious modifications may, it is true, be due to other causes than climate only, but they serve to show how powerfully and mysteriously local conditions affect the form and structure of both plants and animals; and they render it probable that changes of constitution are also continually produced, although we have, in the majority of cases, no means of detecting them. It is also impossible to determine how far the effects described are produced by spontaneous favourable variations or by the direct action of local conditions; but it is probable that in every case both causes are concerned, although in constantly varying proportions.

*The Influence of Heredity.*—Adaptation by variation would, however, be a slow and uncertain process, and might for considerable periods of time cease to act, did not heredity come into play. This is the tendency of every organism to produce its like, or more exactly, to produce a set of new forms varying slightly from it in many directions—a group of which the parent form is the centre. If now one of the most extreme of these variations is taken, it is found to become the centre of a new set of variations; and by continually taking the extreme in the same direction, an increasing variation in that direction can be effected, until checked by becoming so great that it interferes with the healthy action of the organism, or is in any other way prejudicial. It is also found that acquired constitutional peculiarities are equally hereditary; so that by a combination of those two modes of variation any desired adaptation may be effected with greater rapidity. The manner in which the form or constitution of an organism can be made to change continuously in one direction, by means of variations which are indefinite and in all directions, is often misunderstood. It may perhaps be illustrated by showing how a tree or grove of trees might, by natural causes, be caused to travel during successive generations in a definite course. The tree has branches radiating out from its stem to perhaps twenty feet on every side. Seeds are produced on the extremities of all these branches, drop to the ground, and produce seedlings, which, if untouched, would form a ring of young trees around the parent. But cattle crop off every seedling as soon as it rises above the ground, and none can ever arrive at maturity. If, however, one side is protected from the cattle, young trees will grow up on that side only. This protection may exist in the case of a grove of trees which we may suppose to occupy the whole space between two deep ravines, the cattle existing on the lower side of the wood only. In this case young trees would reach maturity on the upper side of the wood, while on the lower side the trees would successively die, fall, and rot away, no young ones taking their place. If this state of things continued unchanged for some centuries, the wood might march regularly up the side of the mountain till it occupied a position many miles away from where it once stood; and this would have taken place, not because more seed was produced on one side than the other (there might even be very much less), nor because soil or climate were better on the upper side (they might be worse), nor because any intelligent being chose which trees should be allowed to live and which should be destroyed;—but simply because, for a series of generations, the conditions permitted the existence of young trees on one side, and wholly prevented it on the other. Just in an analogous way animals or plants are caused to vary in definite directions, either by

the influence of natural agencies, which render existence impossible for those that vary in any other direction, or by the action of the judicious breeder, who carefully selects favourable variations to be the parents of his future stock; and in either case the rejected variations may far outnumber those which are preserved.

Evidence has been adduced by Mr Darwin to show that the tendency to vary is itself hereditary; so that, so far from variations coming to an end, as some persons imagine, the more extensively variation has occurred in any species in the past, the more likely it is to occur in the future. There is also reason to believe that individuals which have varied largely from their parents in a special direction will have a greater tendency to produce offspring varying in that direction than in any other; so that the facilities for adaptation, that is, for the production and increase of favourable variations in certain definite directions, are far greater than the facilities for locomotion in one direction in the hypothetical illustration just given.

*Selection and Survival of the Fittest as Agents in Naturalisation.*—We may now take it as an established fact, that varieties of animals and plants occur, both in domesticity and in a state of nature, which are better or worse adapted to special climates. There is no positive evidence that the influence of new climatal conditions on the parents has any tendency to produce variations in the offspring better adapted to such conditions, although some of the facts mentioned in the preceding sections render it probable that such may be the case. Neither does it appear that this class of variations are very frequent. It is, however, certain that whenever any animal or plant is largely propagated constitutional variations will arise, and some of these will be better adapted than others to the climatal and other conditions of the locality. In a state of nature, every recurring severe winter or otherwise unfavourable season, weeds out those individuals of tender constitution or imperfect structure which may have got on very well during favourable years, and it is thus that the adaptation of the species to the climate in which it has to exist is kept up. Under domestication the same thing occurs by what Mr Darwin has termed “unconscious selection.” Each cultivator seeks out the kinds of plants best suited to his soil and climate, and rejects those which are tender or otherwise unsuitable. The farmer breeds from such of his stock as he finds to thrive best with him, and gets rid of those which suffer from cold, damp, or disease. A more or less close adaptation to local conditions is thus brought about, and breeds or races are produced which are sometimes liable to deterioration on removal even to a short distance in the same country, as in numerous cases quoted by Mr Darwin (*Animals and Plants under Domestication*, vol. ii. p. 273).

*The Method of Acclimatisation.*—Taking into consideration the foregoing facts and illustrations, it may be considered as proved—1st, That habit has little (though it appears to have some) definite effect in adapting the constitution of animals to a new climate; but that it has a decided, though still slight, influence in plants when, by the process of propagation by buds, shoots, or grafts, the individual can be kept under its influence for long periods; 2d, That the offspring of both plants and animals vary in their constitutional adaptation to climate, and that this adaptation may be kept up and increased by means of heredity; and, 3d, That great and sudden changes of climate often check reproduction even when the health of the individuals does not appear to suffer. In order, therefore, to have the best chance of acclimatising any animal or plant in a climate very dissimilar from that of its native country, and in which it has been proved that the species in question cannot live and maintain itself

without acclimatisation, we must adopt some such plan as the following:—

1. We must transport as large a number as possible of adult healthy individuals to some intermediate station, and increase them as much as possible for some years. Favourable variations of constitution will soon show themselves, and these should be carefully selected to breed from, the tender and unhealthy individuals being rigidly eliminated.

2. As soon as the stock has been kept a sufficient time to pass through all the ordinary extremes of climate, a number of the hardiest may be removed to the more remote station, and the same process gone through, giving protection if necessary while the stock is being increased, but as soon as a large number of healthy individuals are produced, subjecting them to all the vicissitudes of the climate.

It can hardly be doubted that in most cases this plan would succeed. It has been recommended by Mr Darwin, and at one of the early meetings of the Société Zoologique d'Acclimatation, at Paris, M. Geoffroy St Hilaire insisted that it was the only method by which acclimatisation was possible. But in looking through the long series of volumes of Reports published by this Society, there is no sign that any systematic attempt at acclimatisation has even once been made. A number of foreign animals have been introduced, and more or less domesticated, and some useful exotics have been cultivated for the purpose of testing their applicability to French agriculture or horticulture; but neither in the case of animals nor of plants has there been any systematic effort to modify the constitution of the species, by breeding largely and selecting the favourable variations that appeared.

Take the case of the *Eucalyptus globulus* as an example. This is a Tasmanian gum-tree of very rapid growth and great beauty, which will thrive in the extreme south of France. In the *Bulletin* of the Society a large number of attempts to introduce this tree into general cultivation in other parts of France are recorded in detail, with the failure of almost all of them. But no precautions such as those above indicated appear to have been taken in any of these experiments; and we have no intimation that either the Society or any of its members are making systematic efforts to acclimatise the tree. The first step would be, to obtain seed from healthy trees growing in the coldest climate and at the greatest altitude in its native country, sowing these very largely, and in a variety of soils and situations, in a part of France where the climate is somewhat but not much more extreme. It is almost a certainty that a number of trees would be found to be quite hardy. As soon as these produced seed, it should be sown in the same district and farther north in a climate a little more severe. After an exceptionally cold season, seed should be collected from the trees that suffered least, and should be sown in various districts all over France. By such a process there can be hardly any doubt that the tree would be thoroughly acclimatised in any part of France, and in many other countries of central Europe; and more good would be effected by one well-directed effort of this kind than by hundreds of experiments with individual animals and plants, which only serve to show us which are the species that do not require to be acclimatised.

*Acclimatisation of Man.*—On this subject we have, unfortunately, very little direct or accurate information. The general laws of heredity and variation have been proved to apply to man as well as to animals and plants; and numerous facts in the distribution of races show that man must, in remote ages at least, have been capable of constitutional adaptation to climate. If the human race constitutes a single species, then the mere fact that man now inhabits every region, and is in each case constitutionally adapted to the climate, proves that acclimatisation has occurred. But we

have the same phenomenon in single varieties of man, such as the American, which inhabits alike the frozen wastes of Hudson's Bay and Terra del Fuego, and the hottest regions of the tropics,—the low equatorial valleys and the lofty plateaux of the Andes. No doubt a sudden transference to an extreme climate is often prejudicial to man, as it is to most animals and plants; but there is every reason to believe that, if the migration occurs step by step, man can be acclimatised to almost any part of the earth's surface in comparatively few generations. Some eminent writers have denied this. Sir Randal Martin, from a consideration of the effects of the climate of India on Europeans and their offspring, believes that there is no such thing as acclimatisation. Dr Hunt, in a report to the British Association in 1861, argues that "time is no agent," and—"if there is no sign of acclimatisation in one generation, there is no such process." But he entirely ignores the effect of favourable variations, as well as the direct influence of climate acting on the organisation from infancy.

Professor Waitz, in his *Introduction to Anthropology*, adduces many examples of the comparatively rapid constitutional adaptation of man to new climatic conditions. Negroes, for example, who have been for three or four generations acclimatised in North America, on returning to Africa become subject to the same local diseases as other unacclimatised individuals. He well remarks, that the debility and sickening of Europeans in many tropical countries are wrongly ascribed to the climate, but are rather the consequences of indolence, sensual gratification, and an irregular mode of life. Thus the English, who cannot give up animal food and spirituous liquors, are less able to sustain the heat of the tropics than the more sober Spaniards and Portuguese. The excessive mortality of European troops in India, and the delicacy of the children of European parents, do not affect the real question of acclimatisation under proper conditions. They only show that acclimatisation is in most cases necessary, not that it cannot take place. The best examples of partial or complete acclimatisation are to be found where European races have permanently settled in the tropics, and have maintained themselves for several generations. There are, however, two sources of inaccuracy to be guarded against, and these are made the most of by the writers above referred to, and are supposed altogether to invalidate results which are otherwise opposed to their views. In the first place, we have the possibility of a mixture of native blood having occurred; in the second, there have almost always been a succession of immigrants from the parent country, who continually intermingle with the families of the early settlers. It is maintained that one or other of these mixtures is absolutely necessary to enable Europeans to continue long to flourish in the tropics.

There are, however, certain cases in which the sources of error above mentioned are reduced to a minimum, and cannot seriously affect the results; such as those of the Jews, the Dutch at the Cape of Good Hope and in the Moluccas, and the Spaniards in South America.

The Jews are a good example of acclimatisation, because they have been established for many centuries in climates very different from that of their native land; they keep themselves almost wholly free from intermixture with the people around them; and they are often so populous in a country that the intermixture with Jewish immigrants from other lands cannot seriously affect the local purity of the race. They have, for instance, attained a population of near two millions in such severe climates as Poland and Russia; and according to Mr Brace (*Races of the Old World*, p. 185), "their increase in Sweden is said to be greater than that of the Christian population;" in the towns of Algeria they are the only race able to maintain its numbers; and in



Cochin China and Aden they succeed in rearing children and forming permanent communities."

In some of the hottest parts of South America Europeans are perfectly acclimatised, and where the race is kept pure it seems to be even improved. Some very valuable notes on this subject have been furnished to the present writer by the well-known botanist Dr Richard Spruce, who resided many years in South America, but who has hitherto been prevented by ill health from giving to the world the results of his researches. As a careful, judicious, and accurate observer, both of man and nature, he has few superiors. He says—

"The white inhabitants of Guayaquil (lat.  $2^{\circ} 13' S.$ ) are kept pure by careful selection. The slightest tincture of red or black blood bars entry into any of the old families who are descendants of Spaniards from the Provincias Vascongadas, or those bordering the Bay of Biscay, where the morals are perhaps the purest (as regards the intercourse of the sexes) of any in Europe, and where for a girl, even of the poorest class, to have a child before marriage is the rarest thing possible. The consequence of this careful breeding is, that the women of Guayaquil are considered (and justly) the finest along the whole Pacific coast. They are often tall, sometimes very handsome, decidedly healthy, although pale, and assuredly prolific enough. Their sons are big, stout men, but when they lead inactive lives are apt to become fat and sluggish. Those of them, however, who have farms in the savannahs, and are accustomed to take long rides in all weathers, and those whose trade obliges them to take frequent journeys in the mountainous interior, or even to Europe and North America, are often as active and as little burdened with superfluous flesh as a Scotch farmer

"The oldest Christian town in Peru is Pura (lat.  $5^{\circ} S.$ ), which was founded by Pizarro himself. The climate is very hot, especially in the three or four months following the southern solstice. In March 1843 the temperature only once fell as low as  $83^{\circ}$ , during the whole month, the usual lowest night temperature being  $85^{\circ}$ . Yet people of all colours find it very healthy, and the whites are very prolific. I resided in the town itself nine months, and in the neighbourhood seven months more. The population (in 1863-4) was about 10,000, of which not only a considerable proportion was white, but was mostly descended from the first emigrants after the conquest. Purity of descent was not, however, quite so strictly maintained as at Guayaquil. The military adventurers, who have often risen to high or even supreme rank in Peru, have not seldom been of mixed race, and fear or favour has often availed to procure them an alliance with the oldest and purest-blooded families."

These instances, so well stated by Dr Spruce, seem to demonstrate the complete acclimatisation of Spaniards in some of the hottest parts of South America. Although we have here nothing to do with mixed races, yet the want of fertility in these has been often taken to be a fact inherent in the mongrel race, and has been also sometimes held to prove that neither the European nor his half-bred offspring can maintain themselves in the tropics. The following observation is therefore of interest:—

"At Guayaquil for a lady of good family—married or unmarried—to be of loose morals is so uncommon, that when it does happen it is felt as a calamity by the whole community. But here, and perhaps in most other towns in South America, a poor girl of mixed race—especially if good-looking—rarely thinks of marrying one of her own class until she has—as the Brazilians say—*aproveitada de sua mocidade* (made the most of her youth) in receiving presents from gentlemen. If she thus bring a good dowry to her husband, he does not care to inquire, or is not

sensitive, about the mode in which it was acquired. The consequences of this indiscriminate sexual intercourse, especially if much prolonged, is to diminish, in some cases to paralyse, the fertility of the female. And as among people of mixed race it is almost universal, the population of these must fall off both in numbers and quality."

The following example of divergent acclimatisation of the same race to hot and cold zones is very interesting, and will conclude our extracts from Dr Spruce's valuable notes:—

"One of the most singular cases connected with this subject that have fallen under my own observation, is the difficulty, or apparent impossibility, of acclimatising the Red Indian in a certain zone of the Andes. Any person who has compared the physical characters of the native races of South America must be convinced that these have all originated in a common stirps. Many local differences exist, but none capable of invalidating this conclusion. The warmth yet shade-loving Indian of the Amazon; the Indian of the hot, dry, and treeless coasts of Peru and Guayaquil, who exposes his bare head to the sun with as much zest as an African negro; the Indian of the Andes, for whom no cold seems too great, who goes constantly bare-legged and often bare-headed, through whose rude straw hut the piercing wind of the paramos sweeps, and chills the white man to the very bones;—all these, in the colour and texture of the skin, the hair, and other important features, are plainly of one and the same race

"Now there is a zone of the equatorial Andes, ranging between about 4000 and 6000 feet altitude, where the very best flavoured coffee is grown, where cane is less luxuriant but more saccharine than in the plains, and which is therefore very desirable to cultivate, but where the red man sickens and dies. Indians taken down from the sierra get ague and dysentery. Those of the plains find the temperature chilly, and are stricken down with influenza and pains in the limbs. I have seen the difficulty experienced in getting farms cultivated in this zone, on both sides of the Cordillera. The permanent residents are generally limited to the major domo and his family; and in the dry season labourers are hired, of any colour that can be obtained—some from the low country, others from the highlands—for three, four, or five months, who gather in and grind the cane, and plant for the harvest of the following year; but a staff of resident Indian labourers, such as exists in the farms of the sierra, cannot be kept up in the *Fungas*, as these half-warm valleys are called. White men, who take proper precautions, and are not chronically soaked with cane-spirit, stand the climate perfectly, but the creole whites are still too much *caballeros* to devote themselves to agricultural work.

"In what is now the republic of Ecuador, the only peopled portions are the central valley, between the two ridges of the Andes—height 7000 to 12,000 feet—and the hot plain at their western base; nor do the wooded slopes appear to have been inhabited, except by scattered savage hordes, even in the time of the Incas. The Indians of the highlands are the descendants of others who have inhabited that region exclusively for untold ages; and a similar affirmation may be made of the Indians of the plain. Now there is little doubt that the progenitors of both these sections came from a temperate region (in North America); so that here we have one moiety acclimatised to endure extreme heat, and the other extreme cold; and at this day exposure of either to the opposite extreme (or even, as we have seen, to the climate of an intermediate zone) is always pernicious and often fatal. But if this great difference has been brought about in the red man, might not the same have happened to the white man? Plainly it might, time being given; for one cannot doubt that the inherent adaptive

bility is the same in both, or (if not) that the white man possesses it in a higher degree."

The observations of Dr Spruce are of themselves almost conclusive as to the possibility of Europeans becoming acclimatised in the tropics; and if it is objected that this evidence applies only to the dark-haired southern races, we are fortunately able to point to facts, almost equally well authenticated and conclusive, in the case of one of the typical Germanic races. At the Cape of Good Hope the Dutch have been settled and nearly isolated for about 200 years, and have kept themselves almost or quite free from native intermixture. They are described as being still perfectly fair in complexion, while physically they are the finest body of men in the colony, being very tall and strong. They marry young, and have large families. The population, according to a census taken in 1798, was under 22,000. In 1865 it was near 182,000, the majority being (according to the *Statesman's Year Book* for 1873) of "Dutch, German, or French origin, mostly descendants of original settlers." We have here a population which has doubled itself every twenty-two years; and the greater part of this rapid increase must certainly be due to the old European immigrants. In the Moluccas, where the Dutch have had settlements for nearly 250 years, some of the inhabitants trace their descent to early immigrants; and these, as well as most of the people of Dutch descent in the East, are quite as fair as their European ancestors, enjoy excellent health, and are very prolific. But the Dutch accommodate themselves admirably to a tropical climate, doing much of their work early in the morning, dressing very lightly, and living a quiet, temperate, and cheerful life. They also pay great attention to drainage and general cleanliness. In addition to these examples, it may be maintained that the rapid increase of English-speaking populations in the United States and in Australia, only a comparatively small portion of which can be due to direct immigration, is far from supporting the view of Dr Knox, that Europeans cannot permanently maintain themselves in those countries. Mr Brace expressly denies that the American physique has degenerated from the English type. He asserts that manufacturers and others find that "for labours requiring the utmost physical endurance and muscular power, such as iron-putting and lumbering in the forests and on the streams, and pioneer work, foreigners are never so suitable as native Americans. The reports of the examining surgeons for volunteers—such as that of Dr W. H. Thomson to the Surgeon-General in 1862, who examined 9000 men—show a far higher average of physique in the Americans examined than in the English, Germans, or Irish. It is a fact well known to our life insurance companies, that the average length of life here is greater than that of the English tables."—*The Races of the Old World*, p. 375. Although the comparisons here instituted may not be quite fair or conclusive, they furnish good arguments against those who maintain that the Americans are physically deteriorating.

On the whole, we seem justified in concluding that, under favourable conditions, and with a proper adaptation of means to the end in view, man may become acclimatised with at least as much certainty and rapidity (counting by generations rather than by years) as any of the lower animals. (A. R. W.)

ACCOLADE (from *collum*, the neck), a ceremony anciently used in conferring knighthood; but whether it was an embrace (according to the use of the modern French word, *accolade*), or a slight blow on the neck or cheek, is not agreed. Both these customs appear to be of great antiquity. Gregory of Tours writes that the early kings of France, in conferring the gilt shoulder-belt, kissed the knights on the left cheek; and William the Conqueror is said to have made use of the blow in conferring the honour of knight-

hood on his son Henry. At first it was given with the naked fist, a veritable box on the ear, but for this was substituted a gentle stroke on the shoulder with the flat of the sword. A custom of a similar kind is still followed in bestowing the honour of knighthood.

ACCOLTI, BENEDICT, was born in 1415 at Arezzo, in Tuscany, of a noble family, several members of which were distinguished like himself for their attainments in law. He was for some time professor of jurisprudence in the University of Florence, and on the death of the celebrated Poggio in 1459 became chancellor of the Florentine republic. He died in 1466. In conjunction with his brother Leonard, he wrote in Latin a history of the first crusade, entitled *De Bello a Christianis contra Barbaros, pro Christi Sepulchro et Judæa recuperandis, libri tres*, which, though itself of little interest, furnished Tasso with the historic basis for his *Jerusalem Delivered*. This work appeared at Venice in 1432, and was translated into Italian in 1543, and into French in 1620. Another work of Accolti's—*De Præstantia Virorum sui Aevi*—was published at Parma in 1689.

ACCOLTI, BERNARD (1465-1535), son of the preceding, known in his own day as *l'Unico Aretino*, acquired great fame as a reciter of impromptu verse. He was listened to by large crowds, composed of the most learned men and the most distinguished prelates of the age. Among others, Cardinal Bembo has left on record a testimony to his extraordinary talent. His high reputation with his contemporaries seems scarcely justified by the poems he published, though they give evidence of brilliant fancy. It is probable that he succeeded better in his extemporary productions than in those which were the fruit of deliberation. His works, under the title *Virginia, Comedia, Capitoli e Strambotti di Messer Bernardo Accolti Aretino*, were published at Florence in 1513, and have been several times reprinted.

ACCOLTI, PIETRO, brother of the preceding, was born at Florence in 1455, and died there in 1549. He was abbreviator under Leo X., and in that capacity drew up in 1520 the famous bull against Luther. In 1527 he was made a cardinal by Clement VII., who had employed him as his secretary.

ACCOMMODATION, a term used in Biblical interpretation to denote the presentation of a truth not absolutely as it is in itself, but relatively or under some modification, with the view of suiting it either to some other truth or to the persons addressed. It is generally distinguished into *formal* and *material*,—the accommodation in the one case being confined to the *method* of teaching, and in the other being extended to the *matter* taught. To the former head may be referred teaching by symbols or parables, by progressive stages graduated according to the capacity of the learner, by the application of prophecy to secondary fulfillments, &c. To the latter head are to be referred the allegations of the anti-supernaturalistic school, that Christ and the writers of Scripture modified or perverted the truth itself in order to secure wider acceptance and speedier success, by speaking in accordance with contemporary ideas rather than with absolute and eternal truth.

ACCOMMODATION, in commerce, denotes generally temporary pecuniary aid given by one trader to another, or by a banker to his customers, but it is used more particularly to describe that class of bills of exchange which represents no actual exchange of real value between the parties.

ACCORAMBONI, VITTORIA, an Italian lady remarkable for her extraordinary beauty and her tragic history. Her contemporaries regarded her as the most captivating woman that had ever been seen in Italy. She was sought in marriage by Paolo Giordano Orsini, Duke of Bracciano, who, it was generally believed, had murdered his wife,



Isabella de Medici, with his own hand; but her father gave her in preference to Francesco Peretti, nephew of Cardinal Montalto. Peretti was assassinated (1581), and a few days afterwards Vittoria fled from the house of the Cardinal, where she had resided, to that of the Duke of Bracciano. The opposition of Pope Gregory XIII, who even went so far as to confine Vittoria to Fort St Angelo for nearly a year, did not prevent her marriage with the duke. On the accession of Montalto to the papal throne as Sixtus V. (1585), the duke thought it prudent to take refuge with his wife in the territory of the Venetian republic. After a few months' residence at Salò, on the Lake of Garda, he died, bequeathing nearly the whole of his large fortune to his widow. This excited the anger of Ludovico Orsini, a relative, who caused Vittoria to be murdered in her residence at Padua (Dec. 22, 1585). The history of this beautiful and accomplished but unfortunate woman has been written by Adry (1800), and recently by Count Gnoli, and forms the basis of Webster's tragedy, *The White Devil*, and of Tieck's romance, *Vittoria Accoromboni*.

ACCORDION (from the French *accord*), a small musical instrument in the shape of a bellows, which produces sounds by the action of wind on metallic reeds of various sizes. It is played by being held in both hands and pulled backwards and forwards, the fingers being left free to touch the keys, which are ranged along each side. The instrument is akin to the concertina, but differs from it in having the chords fixed by a mechanical arrangement. It is manufactured chiefly in Paris.

ACCORSO (in Latin *Accursius*), FRANCIS, an eminent lawyer, born at Florence about 1182. After practising for some time in his native city, he was appointed professor at Bologna, where he had great success as a teacher. He undertook the great work of arranging into one body the almost innumerable comments and remarks upon the Code, the Institutes, and Digests, the confused dispersion of which among the works of different writers caused much obscurity and contradiction. When he was employed in this work, it is said that, hearing of a similar one proposed and begun by Odofred, another lawyer of Bologna, he feigned indisposition, interrupted his public lectures, and shut himself up, till he had, with the utmost expedition, accomplished his design. His work has the vague title of the *Great Gloss*, and, though written in barbarous Latin, has more method than that of any preceding writer on the subject. The best edition of it is that of Godefroi, published at Lyons in 1589, in 6 vols. folio. Accursius was greatly extolled by the lawyers of his own and the immediately succeeding age, and he was even called the *Idol of Jurisconsults*, but those of later times formed a much lower estimate of his merits. There can be no doubt that he has disintegrated with much skill the sense of many laws; but it is equally undeniable that his ignorance of history and antiquities has often led him into absurdities, and been the cause of many defects in his explanations and commentaries. He died at Bologna in 1260. His eldest son Francis, who filled the chair of law at Bologna with great reputation, was invited to Oxford by King Edward I, and in 1275 or 1276 read lectures on law in that university. In 1280 he returned to Bologna, where he died in 1293.

ACCORSO (or ACCURSIUS), MARIANOLO, a learned and ingenious critic, was born at Aquila, in the kingdom of Naples, about 1490. He was a great favourite with Charles V., at whose court he resided for thirty-three years, and by whom he was employed on various foreign missions. To a perfect knowledge of Greek and Latin he added an intimate acquaintance with several modern languages. In discovering and collating ancient manuscripts, for which his travels abroad gave him special opportunities, he displayed uncommon diligence. His work entitled *Diatriba in*

*Ausonum, Solinum, et Ovidium*, printed at Rome, in folio, in 1524, is a singular monument of erudition and critical skill. He bestowed, it is said, unusual pains on Claudian, and made, from different manuscripts, above seven hundred corrections on the works of that poet. Unfortunately these criticisms were never published. He was the first editor of the *Letters of Cassiodorus*, with his *Treatise on the Soul*; and his edition of *Ammianus Marcellinus* (1533) contains five books more than any former one. The affected use of antiquated terms, introduced by some of the Latin writers of that age, is humorously ridiculed by him, in a dialogue published in 1531 (republished, with his name, in 1574), entitled *Oscio. Volscio, Romanaque Eloquentia Interlocutoribus, Dialogus Ludis Romanis actus*. Accorso was accused of plagiarism in his notes on Ausonius; and the determined manner in which he repelled, by a most solemn oath, this charge of literary theft, presents us with a singular instance of anxiety and care to preserve a literary reputation unstained.

ACCOUNT, a Stock Exchange term: e.g., "*To Buy or Sell for the Account*," &c. The word has different, though kindred, significations, all derived from the making up and settling of accounts on particular days, in which stricter sense the word "*Settlement*" is more specially used.

The financial importance of the *Account* may be gathered from the Clearing House returns. Confining ourselves to the six years, from the 30th of April 1867 to the 30th of April 1873, we have the following figures, furnished by the Clearing House to Sir John Lubbock, and communicated by him to the *Times*:—

|                    | On fourths<br>of the Month. | On Stock Exchange<br>Account Days. | On Consols<br>Settling Days. |
|--------------------|-----------------------------|------------------------------------|------------------------------|
| April 1867 to 1868 | £147,113,000                | £444,443,000                       | £132,293,000                 |
| 1868 to 1869       | 161,861,000                 | 550,622,000                        | 142,270,000                  |
| 1869 to 1870       | 168,623,000                 | 594,763,000                        | 148,322,000                  |
| 1870 to 1871       | 168,617,000                 | 635,946,000                        | 169,141,000                  |
| 1871 to 1872       | 229,629,000                 | 942,446,000                        | 233,843,000                  |
| 1872 to 1873       | 265,965,000                 | 1,032,474,000                      | 243,561,000                  |

During the year ending April 30, 1873, the total amount of bills, checks, &c., paid at the Clearing House showed an increase of £643,613,000 during the same period ending April 1872, and of £2,745,924,000 over 1868. The amounts passing through on the 4ths of the month amounted to £265,965,000, showing an increase of £36,336,000 over 1872. The payments on *Stock Exchange Account Days* formed a sum of £1,032,474,600, being an increase of £90,023,000 over 1872. The payments on *Consols Account Days* for the same period amounted to £243,561,000, giving an increase of £9,718,000 over 1872.

In English and Indian-Government Securities, the settlements are monthly, and for foreign, railway, and other securities, generally speaking, they are fortnightly. It follows therefore that in 1867-1868, an ordinary Stock Exchange Account Day involved payments, on Stock Exchange accounts only, averaging about £10,000,000 sterling, and in 1872-3 something like £25,000,000 sterling; and these sums again, enormous as they are, represent for the most part only the balance of much larger transactions. The London Account is, in fact, probably the greatest and most important periodical event in the financial world. The great European centres have their own Account Days and methods of settlement, but the amounts dealt in are very much less than on the London market. The leading cities in the United Kingdom have also their Stock Exchanges, but their practice follows more or less that of London, where the bulk of their business is transacted by means of post and telegraph.

The Account in Consols or other English Government Securities, or in the securities of the Government of India, or in Bank of England Stock, or other Stocks transferable at the Bank of England, extends over a month, the settlements being monthly, and in them the committee of the Stock Exchange does not take cognisance of any bargain for a future account, if it shall have been effected more

than eight days previously to the close of the existing account.

The Account in Securities to Bearer, and, with the above exceptions, in Registered Securities also, extends over a period of from twelve to nineteen days. This period is in each case terminated by the "settlement," which occurs twice in each month (generally about the middle and end), on days fixed by the committee for general purposes of the Stock Exchange in the preceding month.

This "settlement" occupies three continuous days, which are all termed Account days, but the third day is the true Account, Settling, or Pay Day.

Continuation or Carrying-over is the operation by which the settlement of a bargain transacted for money, or for a given account, may for a consideration (called either a "Contango" or a "Backwardation") be deferred for the period of another account. Such a continuation is equivalent to a sale "for the day," and a repurchase for the succeeding account, or to a purchase "for the day," and a re-sale for the succeeding account. The price at which such transactions are adjusted is the "Making-Up" price of the day.

Contango is a technical term which expresses the rate of interest charged for the loan of money upon the security of stock transferred for the period of an account or otherwise, or the rate of interest paid by the buyer to the seller to be allowed to defer paying for the stock purchased, until the next settlement day.

Backwardation, or, as it is more often called, Back (for brevity), in contradistinction to contango, is the amount charged for the loan of stock from one account to the other, and it is paid to the purchaser by the seller in order to allow the seller to defer the delivery of the stock.

A Bull Account is one in which either the purchases have predominated over the sales, or the disposition to purchase has been more marked than the disposition to sell.

A Bear Account is one in which either the sales have preponderated over the purchases, or in which the disposition to sell has been more strongly displayed than the disposition to buy.

Sometimes the Bull or the Bear disposition extends to the great majority of securities, as when there are general falls or general rises. Sometimes a Bull Account in one set of securities is contemporaneous with a Bear Account in another.—*Vide* Crocroft's *Stock Exchange Manual*.

ACCOUNTANT, earlier form ACCOMPTANT, in the most general sense, is a person skilled in accounts. It is applied to the person who has the charge of the accounts in a public office or in the counting-house of a large private business. It is also the designation of a distinct profession, which deals in any required way with mercantile accounts.

ACCOUNTANT-GENERAL, an officer in the English Court of Chancery, who receives all monies lodged in court, and by whom they are deposited in bank and disbursed.

ACCRA or ACRA, a town, or rather a collection of forts, in a territory of the same name, on the Gold Coast of Africa, about 75 miles east of Cape Coast Castle. Of the forts, Fort St James is a British settlement, Crèvecoeur was established by the Dutch, and Christianborg by the Danes; but the two last have since been ceded to Britain.—Christianborg in 1850, and Crèvecoeur in 1871. Accra is considered to be one of the healthiest stations on the west coast of Africa, and has some trade in the productions of the interior,—ivory, gold dust, and palm-oil; while cotton goods, tobacco, rum, and beads are imported in exchange. It is the residence of a British civil commandant.

ACCRINGTON, an important manufacturing town of England, in Lancashire, lies on the banks of a stream called the Hindburn, in a deep valley, 19 miles N. from Manchester and 5 miles E. of Blackburn. It has increased rapidly in recent years, and is the centre of the Manchester cotton-printing trade. There are large cotton factories and print-works, besides bleach-fields, &c., employing many hands. Coal is extensively wrought in the neighbourhood. The town has a good appearance, and among the more handsome buildings are a fine church, in the Gothic style, erected in 1838, and the Peel Institution, an Italian structure, containing an assembly room, a lecture room, &c. The sanitary arrangements generally are good, and a reservoir capable

of containing 140,000,000 gallons has been constructed for the water supply of the town. Accrington is a station on the Lancashire and Yorkshire Railway. The population of the two townships of Old and New Accrington was in 1861, 17,688; and in 1871, 21,788.

ACCUM, FREDERICK, chemist, born at Bückeburg in 1769, came to London in 1793, and was appointed teacher of chemistry and mineralogy at the Surrey Institution in 1801. While occupying this position he published several scientific manuals (*Chemistry*, 1803; *Mineralogy*, 1808; *Crystallography*, 1813), but his name will be chiefly remembered in connection with gas-lighting, the introduction of which was mainly due to him and to the enterprising printseller, Ackermann. His excellent *Practical Treatise on Gaslight* appeared in 1815; and he rendered another valuable service to society by his *Treatise on Adulterations of Food and Culinary Poisons* (1820), which attracted much notice at the time it appeared. Both works, as well as a number of his smaller publications, were translated into German. In consequence of charges affecting his honesty, Accum left London for Germany, and in 1822 was appointed professor in the Industrial Institute and Academy of Architecture at Berlin. He died there in 1838.

ACCUMULATOR, a term applied frequently to a powerful electrical machine, which generates or accumulates, by means of friction, electric currents of high tension,—manifested by sparks of considerable length. Accumulators have been employed in many places for exploding torpedoes and mines, for blasting, &c. An exceedingly powerful apparatus of this kind was employed by the Confederate authorities during the civil war in America for discharging submarine and river torpedoes. Whatever the nature of the materials employed in the construction of the accumulator, or the form which it may assume mechanically, it is simply a modification of, or an improvement upon, the ordinary cylindrical or the plate-glass frictional electrical machine,—the fundamental scientific principle being the same in nearly every case. The exciting body consists generally of a large disc or circular plate of vulcanite,—more frequently termed by electricians "ebonite," in consequence of its resemblance, in point of hardness and of polish, to polished ebony,—the vulcanite disc taking the place of the ordinary circular plate of thick glass.

ACE, the received name for the single point on cards or dice—the unit. Mr Fox Talbot has a speculation (*English Etymologies*, p. 262) that the Latins invented, if not the game of dice, at least the name for the single point, which they called *unus*. The Greeks corrupted this into *dyos*, and at length the Germanic races, learning the game from the Greeks, translated the word into *ace*, which has now become *acc*. The fact, however, is, that the root of the word lies in the Latin *as*, the monetary unit, which is to be identified with the Greek *as*; Doric, *as* or *ds*.

ACEPHALA, a name sometimes given to a section of the molluscous animals, which are divided into *encephala* and *acephala*, according as they have or want a distinctly differentiated head. The *Acephala*, or *Lamellibranchiata*, as they are also called, are commonly known as bivalve shell-fish.

ACEPHALI (from *ἀ* privative, and *κεφαλή*, a head), a term applied to several sects as having no head or leader; and in particular to a sect that separated itself, in the end of the 5th century, from the rule of the patriarchs of Alexandria, and remained without king or bishop for more than 300 years (*Gibbon*, c. xlvii.)

ACEPHALI was also the name given to the levellers in the reign of Henry I, who are said to have been so poor as to have no tenements, in virtue of which they might acknowledge a superior lord.



**ACEPHALI**, or *Acephalous Persons*, fabulous monsters, described by some ancient naturalists and geographers as having no heads.

**ACER**. See **MAPLE**.

**ACERBI**, GIUSEPPE (JOSEPH), an Italian traveller, born at Castel-Goffredo, near Mantua, on the 3d May 1773, studied at Mantua, and devoted himself specially to natural science. In 1798 he undertook a journey through Denmark, Sweden, Finland and Lapland; and in the following year he reached the North Cape, which no Italian had previously visited. He was accompanied in the latter part of the journey by the Swedish colonel Skiöldebrand, an excellent landscape-painter. On his return Acerbi stayed for some time in England, and published his *Travels through Sweden*, &c. (London, 1802), which was translated into German (Weimar, 1803), and, under the author's personal superintendence, into French (Paris, 1804). The French translation received numerous corrections, but even in this amended form the work contains many mistakes. Acerbi rendered a great service to Italian literature by starting the *Biblioteca Italiana* (1816), in which he opposed the pretensions of the Academy della Crusca. Being appointed Austrian consul-general to Egypt in 1826, he entrusted the management of the *Biblioteca* to Gironi, contributing to it afterwards a series of valuable articles on Egypt. While in the East he obtained for the museums of Vienna, Padua, Milan, and Pavia many objects of interest. He returned from Egypt in 1836, and took up his residence in his native place, where he occupied himself with his favourite study till his death in August 1846.

**ACERNUS**, the Latinised name of which **SEBASTIAN FABIAN KLONOWICZ**, a celebrated Polish poet, is generally known, was born at Sulmierzyce in 1551, and died at Lublin in 1608. He was for some time burgo-master and president of the Jews' civil tribunal in the latter town, where he had taken up his residence after studying at Cracow. Though himself of an amiable disposition, his domestic life was very unhappy, the extravagance and misconduct of his wife driving him at last to the public hospital of Lublin, where he ended his days. He wrote both Latin and Polish poems, and the genius they displayed won for him the name of the *Sarmatian Ovid*. The titles of fourteen of his works are known; but a number of these were totally destroyed by the Jesuits and a section of the Polish nobility, and copies of the others are for the same reason exceedingly rare. The *Victoria Deorum ubi continetur Veri Herois Educatio*, a poem in forty-four cantos, cost the poet ten years' labour.

**ACERRA**, in *Antiquity*, a little box or pot, wherein were put the incense and perfumes to be burned on the altars of the gods, and before the dead. It appears to have been the same with what was otherwise called *thuribulum* and *pyxis*. The censers of the Jews were *acerra*; and the Romanists still retain the use of *acerra* under the name of *incense pots*.

The name *acerra* was also applied to an altar erected among the Romans, near the bed of a person recently deceased, on which his friends offered incense daily till his burial. The real intention probably was to fumigate the apartment. The Chinese have still a somewhat similar custom.

**ACERRA**, a town of Italy, in the province of Terra di Lavoro, situated on the river Agno, 7 miles N.E. of Naples, with which it is connected by rail. It is the ancient *Acerræ*, the inhabitants of which were admitted to the privileges of Roman citizenship so early as 332 B.C., and which was plundered and burnt by Hannibal during the second Punic war. A few inscriptions are the only traces time has left of the ancient city. The town stands

in a fertile district, but is rendered very unhealthy by the malaria rising from the artificial water-courses of the surrounding Campagna. It is the seat of a bishop, and has a cathedral and seminary. Flax is grown in the neighbourhood. Population, 11,717.

**ACETIC ACID**, one of the most important organic acids. It occurs naturally in the juice of many plants, and in certain animal secretions; but is generally obtained, on the large scale, from the oxidation of spoiled wines, or from the destructive distillation of wood. In the former process it is obtained in the form of a dilute aqueous solution, in which also the colouring matters of the wine, salts, &c., are dissolved; and this impure acetic acid is what we ordinarily term vinegar. The strongest vinegar sold in commerce contains 5 per cent. of real acetic acid. It is used as a mordant in calico-printing, as a local irritant in medicine, as a condiment, and in the preparation of various acetates, varnishes, &c. Pure acetic acid is got from the distillation of wood, by neutralising with lime, separating the tarry matters from the solution of acetate of lime, evaporating off the water, and treating the dry residue with sulphuric acid. On applying heat, pure acetic acid distills over as a clear liquid, which, after a short time, if the weather is cold, becomes a crystalline mass known by the name of Glacial Acetic Acid. For synthesis, properties, &c., see **CHEMISTRY**.

**ACHAIA**, in *Ancient Geography*, a name differently applied at different periods. In the earliest times the name was borne by a small district in the south of Thessaly, and was the first residence of the Achæans. At a later period *Achaia Propria* was a narrow tract of country in the north of the Peloponnesus, running 65 miles along the Gulf of Corinth, and bounded by the Ionian Sea on the W., by Elis and Arcadia on the S., and by Sicyonia on the E. On the south it is separated from Arcadia by lofty mountains, but the plains between the mountains and the sea are very fertile. Its chief town was Patzæ. The name of Achaia was afterwards employed to denote collectively the states that joined the Achæan League. When Greece was subdued by the Romans, *Achaia* was the name given to the most southerly of the provinces into which they divided the country, and included the *Peloponnesus*, the greater part of Greece Proper, and the islands.

*Achæans and the Achæan League*.—The early inhabitants of Achaia were called *Achæans*. The name was given also in those times to some of the tribes occupying the eastern portions of the Peloponnesus, particularly *Argos* and *Sparta*. Afterwards the inhabitants of Achaia Propria appropriated the name. This republic was not considerable, in early times, as regards either the number of its troops, its wealth, or the extent of its territory, but was famed for its heroic virtues. The Crotonians and Sybarites, to re-establish order in their towns, adopted the laws and customs of the Achæans. After the famous battle of Leuctra, a difference arose betwixt the Lacedæmonians and Thebans, who held the virtue of this people in such veneration, that they terminated the dispute by their decision. The government of the Achæans was democratical. They preserved their liberty till the time of Philip and Alexander; but in the reign of these princes, and afterwards, they were either subjected to the Macedonians, who had made themselves masters of Greece, or oppressed by domestic tyrants. The Achæan commonwealth consisted of twelve inconsiderable towns in Peloponnesus. About 280 years before Christ the republic of the Achæans recovered its old institutions and unanimity. This was the renewal of the ancient confederation, which subsequently became so famous under the name of the **ACHÆAN LEAGUE**—having for its object, not as formerly a common worship, but a substantial political union. Though dating from the year B.C. 280, its import-

ance may be referred to its connection with Aratus of Sicyon, about 30 years later, as it was further augmented by the splendid abilities of Philopœmen. Thus did this people, so celebrated in the heroic age, once more emerge from comparative obscurity, and become the greatest among the states of Greece in the last days of its national independence. The inhabitants of Patræ and of Dyme were the first assertors of ancient liberty. The tyrants were banished, and the towns again made one commonwealth. A public council was then held, in which affairs of importance were discussed and determined; and a register was provided for recording the transactions of the council. This assembly had two presidents, who were nominated alternately by the different towns. But instead of two presidents, they soon elected but one. Many neighbouring towns, which admired the constitution of this republic, founded on equality, liberty, the love of justice, and of the public good, were incorporated with the Achæans, and admitted to the full enjoyment of their laws and privileges. The Achæan League affords the most perfect example in antiquity of the federal form of government; and, allowing for difference of time and place, its resemblance to that of the United States government is very remarkable. (See Arts. AMPHICTYONY and FEDERAL GOVERNMENT; also Freeman's *Federal Government*, 2 vols. 8vo. 1863, and *Comparative Politics*, 8vo. 1873; Droysen, *Geschichte des Hellenismus*, 2 vols.; Helwing, *Geschichte der Achæischen Bundes*.)

ACHAN, the son of Carmi, of the tribe of Judah, at the taking of Jericho concealed two hundred shekels of silver, a Babylonish garment, and a wedge of gold, contrary to the express command of God. This sin proved fatal to the Israelites, who were repulsed at the siege of Ai. In this emergency Joshua prostrated himself before the Lord, and begged that he would have mercy upon his people. Achan was discovered by casting lots, and he and his children were stoned to death. This expiation being made, Ai was taken by stratagem. (Josh. vii. viii.)

ACHARD, FRANZ CARL, a Prussian chemist, born at Berlin on the 28th April 1753, was the first to turn Marggraff's discovery of the presence of sugar in beet-root to commercial account. He erected a factory on an estate in Silesia, granted to him about 1800 by the king of Prussia, and produced there large quantities of sugar to meet the scarcity occasioned by the closing of the West Indian ports to continental traders. In 1812 a similar establishment was erected by Napoleon at Rambouillet, although the Institute of France in 1800, while honouring Achard for his researches, had declared his process to have little practical value. At the close of the war the manufacture of beet-root sugar was protected by duties on other sugars that were almost prohibitive, so that the real worth of Achard's discoveries could not be tested. Achard was a frequent contributor to the *Memoirs of the Academy of Berlin*, and published in 1780 *Chymisch-Physische Schriften*, containing descriptions and results of his very numerous and carefully conducted experiments on the adhesion of bodies. He died in 1821.

ACHARIUS, ERIK, a Swedish physician and botanist, born at Gefle in 1757. The son of a comptroller of customs, he studied first in his native town, and then in 1773 at the University of Upsal, where Linnæus was one of his teachers. In 1782 he took the degree of M.D. at the University of Lund, and practised thereafter in various districts of Sweden. But the direction of his studies had been determined by his contact with Linnæus, and he found his appropriate sphere when he was appointed Professor of Botany at the Wadstena Academy in 1801. Five years before he had been admitted a member of the Academy at Stockholm. He devoted himself to the study of the cryptogamic orders of plants, and especially of the

family of lichens. All his publications were connected with this subject, the *Lichenographia Universalis* (Göttingen, 1804) being the most important. Acharius died of apoplexy in 1819. His name has been given by botanists to more than one species of plants.

ACHATES, the faithful friend and companion of Æneas, celebrated in Virgil's *Æneid* as *fidus Achates*.

ACHEEN. See ACHIN.

ACHELOUS, the largest river in Greece, rises in Mount Pindus, and dividing Ætolia from Acarnania, falls into the Ionian Sea. In the lower part of its course the river winds in an extraordinary manner through very fertile but marshy plains. Its water descends from the mountains, heavily charged with fine mud, which is deposited along its banks and in the sea at its mouth, where a number of small islands have gradually been formed. It was formerly called *Thoas*, from its impetuosity in its upper portion, and Homer gave it the name of *king of rivers*. It has a course of 130 miles. The epithet *Achelous* is used for *aqueus* (Virgil), the ancients calling all water *Achelous*, according to Ephorus. The river is now called *Aspro Potamo*.

ACHENWALL, GOTTFRIED, a German writer, celebrated as having formulated and developed the science (*Wissenschaft der Staaten*), to which he was the first to apply the name *scientia statistica*, or *statistics*. Born at Elbing, in East Prussia, in October 1719, he studied at Jena, Halle, and Leipsic, and took a degree at the last-named university. He removed to Marburg in 1746, where for two years he read lectures on history, and on the law of nature and of nations. Here, too, he commenced those inquiries in statistics by which his name became known. In 1748, having been invited by Münchhausen, the Hanoverian minister, to occupy a chair at the university, he removed to Göttingen, where he resided till his death in 1772. His chief works were connected with statistics. The *Staatsverfassungen der europäischen Reiche* appeared first in 1752, and revised editions—corrected from information which he travelled through England, France, and other countries to collect—were published in 1762 and 1768. He was married in 1752 to a lady named Walther; who obtained some celebrity by a volume of poems published in 1750, and by other writings.

ACHERON, in *Classical Mythology*, the son of Ceres, who, for supplying the Titans with drink when they were in contest with Jupiter, was turned into a river of Hades, over which departed souls were ferried on their way to Elysium. The name eventually was used to designate the whole of the lower world.

ACHILL, or "Eagle" Island, off the west coast of Ireland, forms part of the county of Mayo. It is of triangular shape, and extends 15 miles from east to west, and 12 from north to south, its total area being 51,521 acres. The island is very mountainous; its extreme western point, Achill Head, is a bold and rugged promontory rising to a height of 2222 feet above the sea. Large bogs, incapable of cultivation, alternate with the hills of this desolate isle, of whose extensive surface not more than 500 acres have been reclaimed. The inhabitants earn a scanty subsistence by fishing and tillage; their dwellings are miserable hovels. There is a mission-station on the island, and remains of ancient churches are still extant.

ACHILLES (Ἀχιλλεύς). When first taken up by the legendary history of Greece, the ancestors of Achilles were settled in Phthia and in Ægina. That their original seat, however, was in the neighbourhood of Dodona and the Achelous is made out from a combination of the following facts: That in the *Iliad* (xvi. 233) Achilles prays to Zeus of Dodona; that this district was the first to bear the name of Hellas; that the followers of Achilles at Troy were the only persons named Hellenes in the time of Homer



(Thucyd. i. 3; of *Iliad*, ii. 684, where the more usual name of Myrmidones also occurs); that in *Ægina* Zeus was styled "Hellaniotēs," and that the name of Selloi, applied to the priesthood at Dodona, is apparently identical with the name Hellenes. Whether from this local connection the derivation of the name of Achilles from the same root as Ἀχελῷος should be preferred to the other derivations, such as Ἀχιλλεύς = Ἐχέλαος, "ruler," or Ἀχιλλεύς = "the bane of the Ilians," remains undecided. But this is gained, that we see in what manner the legend of Achilles had its root in the earlier Pelasgic religion, his adherence to which in the prayer just cited would otherwise appear very strange on the part of a hero who, through the influence of Homer and his successors, is completely identified with the Olympian system of gods. According to the genealogy, *Æacus* had two sons, *Peleus* and *Telamon*, of whom the former became the father of Achilles—the latter, of Ajax; but of this relationship between Achilles and Ajax there is no sign in the *Iliad*. *Peleus* ruled in Phthia; and the gods remarking his piety, rewarded him with, among other presents, a wife in the person of the beautiful nereid *Thetis*. After her son was born, *Thetis* appears to have returned to her life in the sea. The boy was placed under his father's friend, the centaur *Chiron*. When six years old he slew lions and boars, and could run down a stag. When nine, he was removed from his instructor to the island of *Scyros*, where, dressed as a girl, he was to be brought up among the daughters of *Lycomedes*, his mother preferring for him a long inglorious life to a brief but splendid career. The same desire for his safety is apparent in other legends, which describe her as trying to make him invulnerable when a child by placing him in boiling water or in a fire, and then saving him with ambrosia; or again, in later story, by dipping him in the river *Styx*, from which he came out, all but the heel which she held, proof against wounds. When the aid of Achilles was found indispensable to the expedition against *Troy*, *Odysseus* set out for *Scyros* as a pedlar, spread his wares, including a shield and spear, before the king's daughters, among whom was Achilles in disguise. Then he caused an alarm of danger to be sounded, upon which, while the girls fled, Achilles seized the arms, and thus revealed himself. Provided with a contingent of 50 ships, and accompanied by the aged *Phoenix* and *Patroclus*, he joined the expedition, which after occupying nine years in raids upon the towns in the neighbourhood of *Troy* and in *Mysia*, as detailed in the epic poem entitled the *Cypria*, culminated in the regular siege of *Troy*, as described in the *Iliad*, the grand object of which is the glorification of our hero. Estranged from his comrades, because his captive *Briseis* had been taken from him, Achilles remained inexorable in his tent, while defeat attended the Greeks. At length, at their greatest need, he yielded so far as to allow *Patroclus* to take his chariot and to assume his armour. *Patroclus* fell, and the news of his death roused Achilles, who, now equipped with new armour fashioned by *Hephaestus*, drove back the Trojans, slew *Hector*, and after dragging his body thrice round the Trojan walls, restored it to *Priam*. With the funeral rites of *Patroclus* the *Iliad* concludes, and the story is taken up by the *Æthiopis*, a poem by *Arctinus* of *Miletus*, in which is described the combat of Achilles first with the amazon *Penthesilea*, and next with *Memnon*. When the latter fell, Achilles drove back the Trojans, and, impelled by fate, himself advanced to the Scean gate, where an arrow from the bow of *Paris* struck his vulnerable heel, and he fell, bewailed through the whole camp. (A. S. M.)

**ACHILLES TATIUS**, a Greek writer, born at *Alexandria*. The precise time when he flourished is uncertain, but it cannot have been earlier than the 5th century, as in his principal work he evidently imitates *Heliodorus*. *Suidas*,

who calls him *Achilles Statius*, says that he was converted from heathenism and became a Christian bishop, but this is doubtful, the more so that *Suidas* also attributes to him a work on the sphere (περί σφαίρας) which is referred to by *Firmicus* (330–50), and must, therefore, have been written by another person. The erotic romance of Achilles Tattius, entitled *The Loves of Clitophon and Leucippe*, is almost certainly the work of a heathen writer. The style of the work is ornate and rhetorical, while the story is often unnatural, and sometimes coarse, and the development of the plot irregular and frequently interrupted. Its popularity at the time it appeared is proved by the many manuscripts of it which still exist, and the value attached to it by modern scholars and critics is seen in the frequency with which it has been reprinted and translated. A Latin translation by *Annibal Cruceius* was published, first in part at *Leyden* in 1544, and then complete at *Basel* in 1554. The Greek text was first printed by *Commelin*, at *Heidelberg*, in 1601. Other editions by *Salmassius* (*Leyden*, 1640), *Mitscherlich* (*Biponti*, 1792), and *Jacobs* (*Leipsic*, 1821), have been superseded by the editions of *Hirschig* (*Paris*, 1856), and *Hercher* (*Leipsic*, 1857). An English translation by A. H. (Anthony Hodges) appeared at *Oxford* in 1638.

**ACHILLINI, ALEXANDER** (1463–1512), a native of *Bologna*, was celebrated as a lecturer both in medicine and in philosophy, and was styled the second *Aristotle*. He and *Mundinus* were the first at *Bologna* to avail themselves of the permission given by *Frederick II.* to dissect dead bodies. His philosophical works were printed in one volume folio, at *Venice*, in 1508, and reprinted with considerable additions in 1545, 1551, and 1568. He also wrote several medical works, chiefly on anatomy.

**ACHIN** (pronounced *Atcheen*), a town and also a state of *Northern Sumatra*; the one state of that island which has been powerful at any time since the discovery of the Cape route to the East, and the only one that still remains independent of the Dutch, though that independence is now menaced.

*De Barros* names *Achin* among the twenty-nine states that divided the sea-board of *Sumatra* when the Portuguese took *Malacca*. *Northern Sumatra* had been visited by several European travellers in the Middle Ages, such as *Marco Polo*, *Friar Odorico*, and *Nicolo Conti*. Some of these as well as Asiatic writers mention *Lambri*, a state which must have nearly occupied the position of *Achin*. But the first voyager to visit *Achin*, by that name, was *Alvaro Tellez*, a captain of *Tristan d'Acunha's* fleet, in 1506. It was then a mere dependency of the adjoining state of *Pedir*; and the latter, with *Pasei*, formed the only states on the coast whose chiefs claimed the title of Sultan. Yet before twenty years had passed *Achin* had not only gained independence, but had swallowed up all other states of *Northern Sumatra*. It attained its climax of power in the time of Sultan *Iskandar Muda* (1607–1636), under whom the subject coast extended from *Aru* opposite *Malacca* round by the north to *Padang* on the west coast, a sea-board of not less than 1100 miles; and besides this, the king's supremacy was owned by the large island of *Nyâs*, and by the continental Malay states of *Johôr*, *Pahang*, *Quedah*, and *Perak*.

The present limits of *Achin* supremacy in *Sumatra* are reckoned to be, on the east coast the River *Tamiang*, in about 4° 25' N. lat., which forms the frontier of territories tributary to *Siak*; and on the west coast a line in about 2° 48' N., the frontier of *Trumon*, a small modern state lying between *Achin* and the Dutch government of *Padang*. Even within these limits the actual power of *Achin* is precarious, and the interior boundary can be laid down only from conjecture. This interior country is totally unexplored. It is believed to be inhabited by tribes kindred

to the Battas, that remarkable race of anthropophagi who adjoin on the south. The whole area of Achin territory, defined to the best of our ability, will contain about 16,400 English square miles. A rate of 20 per square mile, perhaps somewhat too large an average, gives a probable population of 328,000.

The production of rice and pepper forms the chief industry of the Achin territory. From Pedir and other ports on the north coast large quantities of betel-nut are exported to continental India, to Burmah, and to Penang for China. Some pepper is got from Pedir, but the chief export is from a number of small ports and anchorages on the west coast, where vessels go from port to port making up a cargo. Achin ponies are of good repute, and are exported. Minor articles of export are sulphur, iron, sappan-wood, gutta-percha, dammer, rattans, bamboos, benzoin, and camphor from the interior forests. The camphor is that from the *Dryobalanops camphora*, for which so high a price is paid in China, and the whole goes thither, the bulk of that whole being, however, extremely small. Very little silk is now produced, but in the 16th century the quantity seems to have been considerable. What is now wanted for the local textures, which are in some esteem, is imported from China.

The chief attraction to the considerable trade that existed at Achin two centuries ago must have been gold. No place in the East, unless Japan, was so abundantly supplied with gold. We can form no estimate of the annual export, for it is impossible to accept Valentyn's statement that it sometimes reached 80 bahars (512,000 ounces!). Crawford (1820), who always reckoned low, calculated the whole export of Sumatra at 35,530 ounces, and that of Achin at 10,450; whilst Anderson (1826), who tends to put figures too high, reckoned the whole Achin export alone at 32,000 ounces. The chief imports to Achin are opium (largely consumed), rice (the indigenous supply being inadequate), salt, iron ware, piece-goods, arms and ammunition, vessels of copper and pottery, China goods of sorts, and a certain kind of dried fish.

The great repute of Achin at one time as a place of trade is shown by the fact, that to this port the first Dutch (1599) and first English (1602) commercial ventures to the Indies were directed. Lancaster, the English commodore, carried letters from Queen Elizabeth to the king of Achin, and was well received by the prince then reigning, Alauddin Shah. Another exchange of letters took place between King James I. and Iskandar Muda in 1613. But native caprice and natural jealousy at the growing force of the European nations in those seas, the reckless rivalries of the latter and their fierce desire for monopoly, were alike destructive of sound trade; and the English factory, though several times set up, was never long maintained. The French made one great effort under Beaulieu (1621) to establish relations with Achin, but nothing came of it.

Still the foreign trade of Achin, though subject to spasmodic interruptions, was important. Dampier and others speak of the number of foreign merchants settled there,—English, Dutch, Danes, Portuguese, Chinese, Banyans from Guzerat, &c. Dampier says the roads were rarely without ten or fifteen sail of different nations, bringing vast quantities of rice, as well as silks, chintzes, muslins, and opium. Besides the Chinese merchants settled at Achin, others used to come annually with the junks, ten or twelve in number, which arrived in June. A regular fair was then established, which lasted two months, and was known as the China camp,—a lively scene, and great resort of foreigners.

The Achinese are not identical with the Malays proper either in aspect or language. They are said to be taller,

handsomer, and darker, as if with a mixture of blood from India proper. Their language is little known; but though it has now absorbed much Malay, the original part of it is said to have characteristics connecting it both with the Batta and with the Indo-Chinese tongues. The Achin literature, however, is entirely Malay; it embraces poetry, a good deal of theology, and several chronicles.

The name of the state is properly *Acheh*. This the Portuguese made into *Achem*; whilst we, with the Dutch, learned to call it *Achin*. The last appears to have been a Persian or Indian form, suggested by jingling analogy with *Machin* (China).

The town itself lies very near the north-west extremity of Sumatra, known in charts as Achin Head. Here a girdle of ten or twelve small islands affords protection to the anchorage. This fails in N.W. winds, but it is said that vessels may find safe riding at all seasons by shifting their berths. The town lies between two and three miles from the sea, chiefly on the left bank of a river of no great size. This forms a swampy delta, and discharges by three mouths. The central and chief mouth is about 100 yards wide, and has a depth of 20 to 30 feet within the bar. But the latter has barely 4 feet at low tide; at high tide it admits native craft of 20 or 30 tons, and larger craft in the rainy season. The town, like most Malay towns, consists of detached houses of timber and thatch, clustered in enclosed groups called *kampongs*, and buried in a forest of fruit-trees. The chief feature is the palace of the Sultan, which communicates with the river by a canal, and is enclosed, at least partially, by a wall of cut stone.

The valley or alluvial plain in which Achin lies is low, and subject to partial inundation; but it is shut in at a short distance from the town, on the three landward sides, by hills. It is highly cultivated, and abounds in small villages and kampongs, with white mosques interspersed. The hills to the eastward are the spurs of a great volcanic mountain, upwards of 6000 feet in height, called by natives Yamuria, by mariners "the Golden Mountain."<sup>1</sup> Of the town population we find no modern estimate.

The real original territory of the Achinese, called by them Great Achin (in the sense of Achin proper), consists of three districts immediately round the city, distinguished respectively as the 26, the 25, and the 22 *mukims*<sup>2</sup> (or hundreds, to use the nearest English term).

Each of these three districts has two heads, called *panglimas*; and these, according to some modern accounts, constitute the council of state, who are the chief administrators, and in whose hands it lies to depose the sovereign or to sanction his choice of a successor. Late notices speak of a chief minister, apparently distinct from these; and another important member of the government is the Shabandar, who is over all matters of customs, shipping, and commerce.

The court of Achin, in the 17th century, maintained a good deal of pomp; and, according to Beaulieu, the king had always 900 elephants. These animals, though found throughout Sumatra, are now no longer tamed or kept.

Hostilities with the Portuguese began from the time of the first independent king of Achin; and they had little remission till the power of Portugal fell with the loss of Malacca (1641). Not less than ten times before that event were armaments despatched from Achin to reduce Malacca, and more than once its garrison was very hard pressed. One of these armadas, equipped by Iskandar Muda in 1615, gives an idea of the king's resources. It consisted of 500 sail, of which 250 were galleys, and

<sup>1</sup> Several other great volcanic cones exist in the Achin territory, and two visible from seaward rise to a height of 11,000 feet or more in the unexplored interior.

<sup>2</sup> A *mukim* is said properly to embrace 44 households.



among these a hundred were greater than any then used in Europe. 60,000 men were embarked, with the king and his women.

On the death of Iskandar's successor in 1641, the widow was placed on the throne; and as a female reign favoured the oligarchical tendencies of the Malay chiefs, three more queens were allowed to reign successively. Though this series of female sovereigns lasted only fifty-eight years altogether, so dense is apt to be the ignorance of recent history, that long before the end of that period it had become an accepted belief among foreign residents at Achin that there never had been any sovereigns in Achin except females; and hence, by an easy inference, that the Queen of Sheba had been Queen of Achin!

In 1699 the Arab or fanatical party suppressed female government, and put a chief of Arab blood on the throne. The remaining history of Achin is one of rapid decay. Thirty sovereigns in all have reigned from the beginning of the 16th century to the present day.

After the restoration of Java to the Netherlands in 1816, a good deal of weight was attached by the neighbouring English colonies to the maintenance of our influence in Achin; and in 1819 a treaty of friendship was concluded with the Calcutta Government, which excluded other European nationalities from fixed residence in Achin. When the home Government, in 1824, made a treaty with the Netherlands, surrendering our remaining settlements in Sumatra in exchange for certain possessions on the continent of Asia, no reference was made in the articles to the Indian treaty of 1819; but an understanding was exchanged that it should be modified by us, whilst no proceedings hostile to Achin should be attempted by the Dutch.

This reservation was formally abandoned by our Government in a convention signed at the Hague, November 2, 1871; and little more than a year elapsed before the government of Batavia declared war upon Achin. Doubtless there was provocation, as there always will be between such neighbours; but the necessity for war has been greatly doubted, even in Holland. A Dutch force landed at Achin in April 1873, and attacked the palace. It was defeated with considerable loss, including that of the general (Köhler). The approach of the south-west monsoon was considered to preclude the immediate renewal of the attempt; but hostilities were resumed, and Achin fell in January 1874.

(De Barros; Faria y Souza; Valentyn, vol. v.; Beaulieu (in Thévenot's Collection); Dampier; Marsden; Crawford's *Hist. and Decl. of the Ind. Archip.*; J. of Ind. Archip.; Dulaurier in *J. Asiatique*, 3d s. vol. viii.; Anderson's *Acheen*, 1840; Veth, *Achin*, &c. Leyden, 1873, &c.) (H. Y.)

ACHMET, or AHMED, the name of three emperors or sultans of Turkey, the first of the name reigning from 1603 to 1617, the second from 1691 to 1695. Achmet III. succeeded his brother Mustapha II., whom the Janissaries deposed in 1703. After the battle of Pultowa in 1709, Charles XII. of Sweden took refuge with him, and incited him to war with Peter the Great, Czar of Russia. Achmet recovered the Morea from the Venetians (1715); but his expedition into Hungary was less fortunate, his army being defeated at Peterwardein by Prince Eugene in 1716, and again near Belgrade the year after. The empire was distracted during his reign by political disturbances, which were occasioned, in part at least, by his misgovernment; and the discontent of his soldiers at last (1730) drove him from the throne. He died in prison in 1736.

ACHRAY, a small picturesque lake in Perthshire, near Loch Katrine, 20 miles W. of Stirling, which has obtained notoriety from Scott's allusion to it in the *Lady of the Lake*.

ACHROMATIC GLASSES are so named from being specially constructed with a view to prevent the confusion

of colours and distortion of images that result from the use of lenses in optical instruments. When white light passes through a lens, the different-coloured rays that constitute it are refracted or bent aside at different angles, and so converge at different foci, producing a blurred and coloured image. To remedy this compound lenses have been devised, which present a well-defined image, unsurrounded by coloured bands of light. To instruments fitted with lenses of this kind has been given the name *achromatic*, from *a* privative, and *χρῶμα*, colour. The celebrated optician, John Dollond, was the first to surmount this practical difficulty, about the year 1757, by the use of a combination of crown and flint glass. See OPTICS, MICROSCOPE, &c.

ACI REALE, a city and seaport of Sicily, in the Italian province of Catania, near the base of Mount Etna. It stands on solidified lava, which has here been deposited by different streams to a depth of 560 feet. The town, which has been almost entirely re-erected since the earthquake of 1693, is built of lava, contains many handsome edifices, and is defended by a fortress. Linen, silks, and cutlery are manufactured, and the trade in cotton, flax, grain, and wines is considerable. The place is celebrated for its cold sulphurous mineral waters. Near Aci Reale is the reputed scene of the mythical adventures of Acis and Galatea; and on this account several small towns in the neighbourhood also bear the name of Aci, such as Aci Castello, Aci Terra, &c. Aci Reale has a population of 24,161.

ACID, a general term in chemistry, applied to a group of compound substances, possessing certain very distinctive characteristics. All acids have one essential property, viz., that of combining chemically with an alkali or base, forming a new compound that has neither acid nor alkaline characters. The new bodies formed in this way are termed *salts*. Every acid is therefore capable of producing as many salts as there are basic substances to be neutralised; and this salt-forming power is the best definition of an acid substance.

The majority of acids possess the following *contingent* properties:—

1. When applied to the tongue, they excite that sensation which is called *sour* or *acid*.

2. They change the blue colours of vegetables to a red. The vegetable blues employed for this purpose are generally tincture of litmus and syrup of violets or of radishes, which have obtained the name of *re-agents* or *tests*. If these colours have been previously converted to a *green* by alkalis, the acids restore them.

All these secondary properties are variable; and if we attempted to base a definition on any one of them, many important acids would be excluded. Take the case of a body like silica, so widely diffused in nature. Is pure silicious sand or flint an acid or a neutral substance? When it is examined, it is found to be insoluble in water, to be devoid of taste, and to possess no action on vegetable colouring matters; yet this substance is a true acid, because when it is heated along with soda or lime, it forms the new body commonly called glass, which is chemically a salt of silicic acid. Many other acids resemble silica in properties, and would be mistaken for neutral bodies if the salt-forming power was overlooked.

Another method of regarding an acid, which is found of great importance in discussing chemical reactions, is to say an acid is a *salt* whose base is *water*. This definition is very apparent if we regard what takes place in separating the acid from a salt. In this decomposition the acid would appear to be left without having any substitute for the removed alkali. This is not however the case, as *water* is found to enter into union instead of the base. Thus every true acid must contain *hydrogen*; and if this is displaced

by a metal, salts are formed directly. An acid is therefore a salt, whose metal is *hydrogen*. The full importance of the definition of an acid will be learned under the heading *CHEMISTRY*.

**ACIDALIUS, VALENS**, a very distinguished scholar and critic, born in 1567 at Wittstock, in Brandenburg. After studying at Rostock and Helmstaedt, and residing about three years in Italy, he took up his residence at Breslau, where he professed the Roman Catholic religion. His excessive application to study was supposed to have caused his untimely death, which occurred in 1595, when he had just completed his twenty-eighth year. He wrote notes on Tacitus and Curtius, a commentary on Plautus, and a number of poems, which are inserted in the *Deliciae* of the German poets. Baillet gave him a place among his *Enfans Célèbres*, and tells that he wrote the commentary on Plautus and several of the Latin poems when he was only seventeen or eighteen years of age.

**ACINACES**, an ancient Persian sword, short and straight, and worn, contrary to the Roman fashion, on the right side, or sometimes in front of the body, as shown in the bas-reliefs found at Persepolis. Among the Persian nobility they were frequently made of gold, being worn as a badge of distinction. The acinaces was an object of religious worship with the Scythians and others (*Herod. iv. 62*).

**ACIS**, in *Mythology*, the son of Faunus and the nymph Symathis, was a beautiful shepherd of Sicily, who being beloved by Galatea, Polyphemus the giant was so enraged that he crushed his rival with a rock, and his blood gushing forth from under the rock, was metamorphosed into the river bearing his name (*Ovid, Met. xiii. 750; Sil. Ital. xiv. 221*). This river, now *Fiume di Jaci*, or *Acus Grandi*, rises under a bed of lava on the eastern base of Etna, and passing Acì Reale, after a rapid course of one mile, falls into the sea. The waters of the stream, once celebrated for their purity, are now sulphureous.

**ACKERMANN, JOHN CHRISTIAN GOTTLIEB**, a learned physician and professor of medicine, born at Zeulenroda, in Upper Saxony, in 1756. At the early age of fifteen he became a student of medicine at Jena, where he soon attracted the favourable notice of Baldinger, who undertook the direction of his studies. When Baldinger was transferred to Göttingen in 1773, Ackermann went with him, and afterwards studied for two years at Halle. A few years' practice at Stendal (1778-99), where there were numerous factories, enabled him to add many valuable original observations to his translation of Ramazzini's *Treatise of the Diseases of Artificers* (1780-83). In 1786 he became professor of medicine at the university of Altorf, in Franconia, occupying first the chair of chemistry, and then, from 1794 till his death in 1801, that of pathology and therapeutics. Dr Ackermann's knowledge of the history of medicine may be estimated by his valuable contributions to Harless's edition of Fabricius' *Bibliotheca Græca*. He wrote numerous original works, besides translations.

**ACEMETÆ** (ἀκούμτος, sleepless), an order of monks instituted by Alexander, a Syrian, about the middle of the 5th century. Founding on the precept, *Pray without ceasing*, they celebrated divine service uninterruptedly night and day, for which purpose they divided themselves into three sections, that relieved each other in turn. The chief seat of the Acemetæ was the cloister *Studium* at Constantinople, whence they were sometimes called *Studites*. Having adopted the monophysite heresy, they were put under the Papal ban about the year 536.

**ACOLYTE** (from ἀκόλουθος, an attendant), one of a minor order of clergy in the ancient church, ranking next to the sub-deacon. We learn from the canons of the

fourth Council of Carthage that the archdeacon, at their ordination, put into their hands a candlestick with a taper and an empty pitcher, to imply that they were appointed to light the candles of the church and to furnish wine for the eucharist. Their dress was the cassock and surplice. The name and office still exist in the church.

**ACONCAGUA**, a province of Chile, South America, is about 100 miles long by 40 miles wide, and lies between 31° 30' and 33° 20' S. lat., and 70° and 71° 30' W. long., between the provinces of Valparaiso and Santiago on the N. and Coquimbo on the S. A large part of the province is mountainous, but it contains several rich and fertile valleys, which yield wheat, maize, sugar-cane, fruits, and garden produce in abundance. In the agricultural districts there are raised from 50 to 60 fanegas of wheat for every quadra, equal to about 35 bushels per English acre. The province has also mineral resources, but not to such extent as Coquimbo or Atacama. Its chief town is San Felipe. The mountain Aconcagua, one of the loftiest peaks of the Andes, rises to the height of 23,910 feet above the sea on the frontier between this province and Mendoza, a department of the Argentine Republic. A river of the same name rises on the south side of the mountain, and after a course of 230 miles falls into the Pacific 12 miles N. of Valparaiso. Population (1870), 134,178.

**ACONITE, ACONITUM**, a genus of plants commonly known as Aconite, Monkshood, Friar's Cap, or Helmet flower, and embracing about 18 species, chiefly natives of the mountainous parts of the northern hemisphere. They are distinguished by having one of the five blue or yellow coloured sepals in the form of a helmet; hence the English name. Two of the petals placed under the hood of the calyx are supported on long stalks, and have a hollow spur at their apex. The genus belongs to the natural order Ranunculaceæ, or the Buttercup family. *Aconitum Napellus*, common monkshood, is a doubtful native of Britain. It is an energetic irritant and narcotic poison. It causes death by a depressing effect on the nervous system, by producing palsy of the muscles concerned in breathing, and by fainting. A tincture prepared by the action of spirit on the roots is used medicinally to allay pain, especially in cases of tic. Its roots have occasionally been mistaken for horse-radish. The Aconite has a short underground stem, from which dark-coloured tapering roots descend. The crown or upper portion of the root gives rise to new plants. When put to the lip, the juice of the Aconite root produces a feeling of numbness and tingling. The horse-radish root, which belongs to the natural order Cruciferae, is much longer than that of the Aconite, and it is not tapering; its colour is yellowish, and the top of the root has the remains of the leaves on it. It has a pungent taste. Many species of Aconite are cultivated in gardens, some having blue and others yellow flowers. *Aconitum Lycocotum*, Wolfsbane, is a yellow-flowered species common on the Alps of Switzerland. One species, *Aconitum heterophyllum*, found in the East Indies, and called Butees, has tonic properties in its roots. The roots of *Aconitum ferox* supply the famous Indian (Nipal) poison called Bikh, Bish, or Nabee. This species is considered by Hooker and Thomson as a variety of *Aconitum Napellus*. *Aconitum palmatum* yields another of the celebrated Bikh poisons. *Aconitum luridum*, of the Himalayas, also furnishes a poison.

**ACONTIUS**, the Latinised form of the name of GIACOMO ACONCRO, a philosopher, jurisconsult, engineer, and theologian, born at Trent on the 7th September 1492. He embraced the reformed religion; and after having taken refuge for a time in Switzerland and Strasburg, he came to England about 1558. He was very favourably received by



Queen Elizabeth, at whose court, it is said, though on doubtful authority, that he resided for a considerable period. With the sanction of Parliament, he carried on for several years extensive works for the embankment of the Thames, and so reclaimed a large quantity of waste land, part of which was bestowed upon him by way of recompense. His gratitude to Queen Elizabeth was expressed in the dedication to her of his celebrated *Collection of the Stratagems of Satan*, which has been often translated, and has passed through many editions. Various opinions have been given of this work, which advocated toleration to an extent that many considered indifference. The nature of its doctrine may perhaps be best gathered from the fact that it gained for the author the praise of Arminius, and the strong condemnation of the Calvinists. Acotius also wrote a treatise, *Dé Methodo*, which was published at Basel in 1558. He died in London about the year 1566.

ACORUS, a genus of monocotyledonous plants belonging to the natural order Aroides, and the sub-order Orontiacae. *Acorus Calamus*, sweet-sedge or sweet-flag, is a native of Britain. It has an agreeable odour, and has been used as a strengthening remedy, as well as to allay spasms. The starchy matter contained in its running stem or rhizome is associated with a fragrant oil, and it is used as hair-powder. Confectioners form a candy from the rhizomes of the plant, and it is also used by perfumers in preparing aromatic vinegar.

ACOSTA, CHRISTOVAL D', a Portuguese naturalist, born at Mozambique in the early part of the 16th century. On a voyage to Asia he was taken captive by pirates, who exacted from him a very large ransom. After spending some years in India, chiefly at Goa, a Portuguese colony, he returned home, and settled as a surgeon at Burgos. Here he published his *Tratado de las drogas y medicinas de las Indias orientales* (1578). This work was translated into Latin, Italian, and French, became well known throughout Europe, and is still consulted as an authority. Acosta also wrote an account of his travels, a book in praise of women, and other works. He died in 1580.

ACOSTA, JOSEPH D', a celebrated Spanish author, was born at Medina del Campo about the year 1539. In 1571 he went to Peru as a provincial of the Jesuits; and, after remaining there for seventeen years, he returned to his native country, where he became in succession visitor for his order of Aragon and Andalusia, superior of Valladolid, and rector of the university of Salamanca, in which city he died in February 1600. About ten years before his death he published at Seville his valuable *Historia Natural y Moral de las Indias*, part of which had previously appeared in Latin; with the title *De Natura Novi Orbis, libri duo*. This work, which has been translated into all the principal languages of Europe, gives exceedingly valuable information regarding the condition of South America at the time. On the subject of climate Acosta was the first to propound the theory, afterwards advocated by Buffon, which attributed the different degrees of heat in the old and new continents to the agency of the winds. He also contradicted, from his own experience, the statement of Aristotle, that the middle zone of the earth was so scorched by the sun as to be destitute of moisture, and totally uninhabitable. Even after the discovery of America this Aristotelian dogma was an article of faith, and its denial was one ground of the charge of scepticism and atheism brought against Sir Walter Raleigh. Acosta, however, boldly declared that what he had seen was so different from what he had expected, that he could not but "laugh at Aristotle's meteors and his philosophy." In speaking of the conduct of his countrymen, and the means they employed for the propagation of their faith, Acosta is in no respect superior to the other prejudiced writers of his country and age. Though he

acknowledges that the career of Spanish conquest was marked by the most savage cruelty and oppression, he yet represents this people as chosen by God to spread the gospel among the nations of America, and recounts a variety of miracles as a proof of the constant interposition of Heaven in favour of the merciless and rapacious invaders. Besides his *History*, Acosta wrote the following works:—1. *De Promulgatione Evangelii apud Barbaros*; 2. *De Christo Revelato*; 3. *De Temporibus Novissimis*, lib. vi.; 4. *Concionum tomi iii.*

ACOSTA, URIEL D', a Portuguese of noble family, was born at Oporto towards the close of the 16th century. His father being a Jewish convert to Christianity, he was brought up in the Roman Catholic faith, and strictly observed the rites of the church till the course of his inquiries led him, after much painful doubt, to abandon the religion of his youth for Judaism. Passing over to Amsterdam, he was received into the synagogue, having his name changed from Gabriel to Uriel. He soon discovered, however, that those who sat in Moses' seat were shameful perverters of the law; and his bold protests served only to exasperate the rabbis, who finally punished his contumacy with the greater excommunication. Persecution seemed only to stimulate his temerity, and he soon after published a defence, *Examen das tradições Phariseas, &c.*, in which he not merely exposed the departures of the Jewish teachers from the law, but combated the doctrine of a future life, holding himself supported in this position by the silence of the Mosaic Books. For this he was imprisoned and fined, besides incurring public odium as a blasphemous and atheist. Nothing deterred, he pursued his speculations, which ended in his repudiating the divine authority of the law of Moses. Wearied, however, by his melancholy isolation, and longing for the benefits of society, he was driven, in the inconsistency of despairing scepticism, to seek a return to the Jewish communion. Having recanted his heresies, he was readmitted after an excommunication of fifteen years, but was soon excommunicated a second time. After seven years of miserable exclusion, he once more sought admission, and, on passing through a humiliating penance, was again received. These notices of his singular and unhappy life are taken from his autobiography, *Exemplar Humanæ Vitæ*, published, with a "refutation," by Limborch, and republished in 1847. It has been said that he died by his own hand, but this is, to say the least, doubtful. His eventful history forms the subject of a tale and of a tragedy by Gutzkow.

ACOTYLEDONES, the name given to one of the Classes of the Natural System of Botany, embracing flowerless plants, such as ferns, lycopods, horse-tails, mosses, liverworts, lichens, sea-weeds, and mushrooms. The name is derived from the character of the embryo, which has no cotyledon. Flowering plants have usually one or two cotyledons, that is, seed-leaves or seed-lobes connected with their embryo; while in flowerless plants the body representing the embryo consists of a cell, called a spore, without any leaves. The plants have no flowers, and their organs of reproduction are inconspicuous, hence they are called by Linneus cryptogamous. Some flowering plants, such as dodders, have no cotyledons; and some have the cotyledons divided into more than two, as in conifers. Some acotyledonous spores, when sprouting, produce a leaf-like expansion called a prothallus, on which the organs of reproduction, consisting of antheridia and archegonia, are produced. This is well seen in the case of ferns. In the interior of the antheridian cells, moving filamentous bodies, called spermatozooids, have been observed. These fertilise the archegonial cells, whence new plants are produced. In the article BOTANY these plants will be noticed under Class III. of the Natural System.

# ACOUSTICS

**Definition. 1.** **ACOUSTICS** (from *ἀκούω*, to hear) is that branch of Natural Philosophy which treats of the nature of sound, and the laws of its production and propagation, in so far as these depend on physical principles. The description of the mechanism of the organ of voice and of the ear, and the difficult questions connected with the processes by which, when sound reaches the drum of the ear, it is transmitted to the brain, must be dealt with in separate articles of this work. It is to the physical part of the science of acoustics that the present article is restricted.

## PART I.

### General notions as to Vibrations, Waves, &c.

Sound is due to vibrations.

2. We may easily satisfy ourselves that, in every instance in which the sensation of sound is excited, the body, whence the sound proceeds, must have been thrown, by a blow or other means, into a state of agitation or tremor, implying the existence of a vibratory motion, or motion to and fro, of the particles of which it consists.

Thus, if a common glass-jar be struck so as to yield an audible sound, the existence of a motion of this kind may be felt by the finger lightly applied to the edge of the glass; and, on increasing the pressure so as to destroy this motion, the sound forthwith ceases. Small pieces of cork put in the jar will be found to dance about during the continuance of the sound; water or spirits of wine poured into the glass will, under the same circumstances, exhibit a ruffled surface. The experiment is usually performed, in a more striking manner, with a bell-jar and a number of small light wooden balls suspended by silk strings to a fixed frame above the jar, so as to be just in contact with the widest part of the glass. On drawing a violin bow across the edge, the pendulums are thrown off to a considerable distance, and falling back are again repelled, &c.

It is also in many cases possible to follow with the eye the motions of the particles of the sounding body, as, for instance, in the case of a violin string or any string fixed at both ends, when the string will appear, by a law of optics, to occupy at once all the positions which it successively assumes during its vibratory motion.

Sound is propagated to the ear by vibrations of air, &c.

3. It is, moreover, essential, in order that the ear may be affected by a sounding body, that there be interposed between it and the ear one or more intermediate bodies (*media*), themselves capable of molecular vibration, which shall receive such motion from the source of sound, and transmit it to the external parts of the ear, and especially to the *membrana tympani* or *drum* of the ear. This statement is confirmed by the well-known effect of stopping the ear with soft cotton, or other substance possessing little elasticity.

The air around us forms the most important medium of communication of sound to our organs of hearing; in fact, were air devoid of this property, we should practically be without the sense of hearing. In illustration of the part thus assigned to the atmosphere in acoustics, an apparatus has been constructed, consisting of a glass receiver, in which is a bell and a hammer connected with clock-work, by which it can be made to strike the bell when required. The receiver is closed air-tight by a metal plate, through which passes, also air-tight, into the interior, a brass rod. By properly moving this rod with the hand, a detent is released, which checks the motion of the wheel-work, and the hammer strikes the bell continuously, till the detent is pushed into its original position. As long as the air in

the receiver is of the usual atmospheric density, the sound is perfectly audible. But on rarefying the air by means of an air-pump (the clock-work apparatus having been separated from the plate of the pump by means of a padding of soft cotton), the sound grows gradually fainter, and at last becomes inaudible when the rarefaction of the air has reached a very low point. If, however, at this stage of the experiment, the metal rod be brought into contact with the bell, the sound will again be heard clearly, because now there is the necessary communication with the ear. On readmitting the air, the sound recovers its original intensity. This experiment was first performed by Hawksbee in 1705.

4. Inasmuch, then, as sound necessarily implies the Laws of existence in the sounding body, in the air, &c., and (we may add) in the ear itself, of vibratory motion of the particles of the various media concerned in the phenomenon, a general reference to the laws of such motion is essential to a right understanding of the principles of acoustics.

The most familiar instance of this kind of motion is afforded by the pendulum, a small heavy ball, for instance, attached to a fine string, which is fixed at its other end. There is but one position in which the ball will remain at rest, viz., when the string is vertical, there being then equilibrium between the two forces acting on the body, the tension of the string and the earth's attractive force or gravity. Thus, in the adjoining fig., if C is the point of suspension, and CA the vertical through that point of length  $l$ , equal to the string, A is the equilibrium position of the particle.

Let now the ball be removed from A to P, the string being kept tight, so that P describes the arc AP of a circle of radius equal to  $l$ , and let the ball be there dropped. The tension of the string not being now directly opposite in direction to gravity ( $g$ ), motion will ensue, and the body will retrace the arc PA. In doing so, it will continually increase its velocity until it reaches the point A, where its velocity will be a maximum, and will consequently pass to the other side of A towards Q.

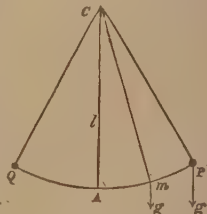


Fig. 1.

But now gravity tends to draw it back towards A, and hence the motion becomes a retarded one; the velocity continually diminishes, and is ultimately destroyed at some point Q, which would be, at a distance from A equal to that of P, but for the existence of friction, resistance of the air, &c., which make that distance less. From Q it will next move down with accelerated motion towards A, where it will have its greatest velocity in the direction from left to right, and whence it will pass onwards towards P, and so on. Thus the body will vibrate to and fro on either side of A, its amplitude of vibration or distance between its extreme positions gradually diminishing in consequence of the resistances before mentioned, and at last being sensibly reduced to nothing, the body then resuming its equilibrium-position A.

If the amplitude of vibration is restricted within inconsiderable limits, it is easy to prove that the motion takes place just as if the string were removed, the ball deprived altogether of weight and urged by a force directed to the point A, and proportional to the distance from that point. For then, if  $m$  be any position of the ball, the chord  $mA$  may be regarded as coincident with the tangent to the



circle at  $m$ , and therefore as being perpendicular to  $Cm$ . Hence  $g$ , acting parallel to  $CA$ , being resolved along  $Cm$  and  $mA$ , the former component is counteracted by the tension of the string, and there remains as the only effective acceleration, the tangential component along  $mA$ , which, by the triangle of forces, is equal to  $g \frac{Am}{Cm}$  or  $\frac{g}{l} Am$ , and is therefore proportional to  $Am$ .

On this supposition of indefinitely small vibrations, the pendulum is isochronous; that is, the time occupied in passing from one extreme position to the other is the same, for a given length  $l$  of the pendulum, whatever the extent of vibration.

We conclude from this that, whatever may be the nature of the forces by which a particle is urged, if the resultant of those forces is directed towards a fixed point, and is proportional to the distance from that point, the particle will oscillate to and fro about that point in times which are independent of the amplitudes of the vibrations, provided these are very small.

5. The particle, whose vibratory motion we have been considering, is a solitary particle acted on by external forces. But, in acoustics, we have to do with the motion of particles forming a connected system or medium, in which the forces to be considered arise from the mutual actions of the particles. These forces are in equilibrium with each other when the particles occupy certain relative positions. But, if any new or disturbing force act for a short time on any one or more of the particles, so as to cause a mutual approach or a mutual recession, on the removal of the disturbing force, the disturbed particles will, if the body be elastic, forthwith move towards their respective positions of equilibrium. Hence arises a vibratory motion to and fro of each about a given point, analogous to that of a pendulum, the velocity at that point being always a maximum, alternately in opposite directions. Thus, for example, if to one extremity of a pipe containing air were applied a piston, of section equal to that of the pipe, by pushing in the piston slightly and then removing it, we should cause particles of air, forming a thin section at the extremity of the pipe, to vibrate in directions parallel to its axis.

In order that a medium may be capable of molecular vibrations, it must, as we have mentioned, possess elasticity, that is, a tendency always to return to its original condition when slightly disturbed out of it.

6. We now proceed to show how the disturbance whereby certain particles of an elastic medium are displaced from their equilibrium-positions, is successively transmitted to the remaining particles of the medium, so as to cause these also to vibrate to and fro.

Let us consider a line of such particles  $y, x, a, b, \&c.$

$y \quad x \quad a \quad a_1 \quad b \quad c \quad d \quad e \quad f \quad g \quad h \quad i \quad k \quad l \quad m \quad n \quad o \quad p$   
 $\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$

equidistant from each other, as above; and suppose one of them, say  $a$ , to be displaced, by any means, to  $a_1$ . As we have seen, this particle will swing from  $a_1$  to  $a$ , and back again, occupying a certain time  $T$ , to complete its double vibration. But it is obvious that, the distance between  $a$  and the next particle  $b$  to the right being diminished by the displacement of the former to  $a_1$ , a tendency is generated in  $b$  to move towards  $a$ , the mutual forces being no longer in equilibrium, but having a resultant in the direction  $ba_1$ . The particle  $b$  will therefore also suffer displacement, and be compelled to swing to and fro about the point  $b$ . For similar reasons the particles  $c, d, \&c.$  will all likewise be thrown into vibration. Thus it is, then, that the disturbance propagates itself in the direction under consideration. There is evidently also, in the case sup-

posed, a transmission from  $a$  to  $x, y, \&c.$ , i.e., in the opposite direction.

Confining our attention to propagation in the direction  $abc \dots$ , we have next to remark that each particle in that line will be affected by the disturbance always later than the particle immediately preceding it, so as to be found in the same stage of vibration a certain interval of time, after the preceding particle.

7. Two particles which are in the same stage of vibration, that is, are equally displaced from their equilibrium-positions, and are moving in the same direction and with equal velocities, are said to be in the same phase. Hence we may express the preceding statement more briefly thus: Two particles of a disturbed medium at different distances from the centre of disturbance, are in the same phase at different times, the one whose distance from that centre is the greater being later than the other.

8. Let us in the meantime assume that, the intervals  $ab, bc, cd, \dots$  being equal, the intervals of time which elapse between the like phases of  $b$  and  $a$ , of  $c$  and  $b, \dots$  are also equal to each other, and let us consider what at any given instant are the appearances presented by the different particles in the row.

$T$  being the time of a complete vibration of each particle, let  $\frac{T}{p}$  be the interval of time requisite for any phase of  $a$  to pass on to  $b$ . If then at a certain instant  $a$  is displaced to its greatest extent to the right,  $b$  will be somewhat short of, but moving towards, its corresponding position,  $c$  still further short, and so on. Proceeding in this way, we shall come at length to a particle  $p$ , for which the distance  $ap = p \cdot ab$ , which therefore lags in its vibrations behind  $a$  by a time  $= p \times \frac{T}{p} = T$ , and is consequently precisely in the same phase as  $a$ . And between these two particles  $a, p$ , we shall evidently have particles in all the possible phases of the vibratory motion. At  $h$ , which is at distance from  $a = \frac{1}{2}ap$ , the difference of phase, compared with  $a$ , will be  $\frac{1}{2}T$ , that is,  $h$  will, at the given instant, be displaced to the greatest extent on the opposite side of its equilibrium-position from that in which  $a$  is displaced; in other words,  $h$  is in the exactly opposite phase to  $a$ .

9. In the case we have just been considering, the vibrations of the particles have been supposed to take place in a direction coincident with that in which the disturbance passes from one particle to another. The vibrations are then termed *longitudinal*.

But it need scarcely be observed that the vibrations may take place in any direction whatever, and may even be curvilinear. If they take place in directions at right angles to the line of progress of the disturbance, they are said to be *transversal*.

10. Now the reasoning employed in the preceding case will evidently admit of general application, and will, in particular, hold for transversal vibrations. Hence if we mark (as is done in fig. 2) the positions  $a, b, c, \dots$ , occupied by the various particles, when swinging transversely, at the instant at which  $a$  has its maximum displacement above its equilibrium-position, and trace a continuous line running through the points so found, that line will by its ordinates indicate to the eye the state of motion at the given instant.

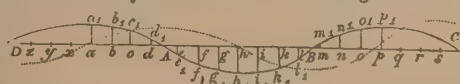


Fig. 2.

Thus  $a$  and  $p$  are in the same phase, as are also  $b$  and  $g, c$  and  $r, \&c.$   $a$  and  $h$  are in opposite phases, as are also  $b$  and  $i, c$  and  $k, \&c.$

Acoustic vibrations.

Transmission of vibrations.

Longitudinal and transversal vibrations.

Wave of transversal displacements.

Distances  $ap$ ,  $bq$ , &c., separating particles in the same phase, and each of which, as we have seen, is passed over by the disturbance in the time  $T$  of a complete vibration, include within them *all* the possible phases of the motion.

Beyond this distance, the curve repeats itself exactly, that is, the phases recur in the same order as before.

Now the figure so traced offers an obvious resemblance to the undulating surface of a lake or other body of water, after it has been disturbed by wind, exhibiting a wave with its trough  $AA_1B_1$  and its crest  $BP_1C_1$ . Hence have been introduced into Acoustics, as also into Optics, the terms *wave* and *undulation*. The distance  $ap$ , or  $bq$ ... or  $A_1C_1$ , which separates two particles in same phase, or which includes both a wave-crest and a wave-trough, is termed the *length of the wave*, and is usually denoted by  $\lambda$ .

As the curve repeats itself at intervals each  $=\lambda$ , it follows that particles are in the same phase at any given moment, when the distances between them in the direction of transmission of the disturbance  $=\lambda, 2\lambda, 3\lambda$ ... and generally  $=n\lambda$ , where  $n$  is any whole number.

Particles such as  $a$  and  $h$ ,  $b$  and  $i$ , &c., which are at distances  $=\frac{1}{2}\lambda$ , being in *opposite* phases, so will also be

particles separated by distance,  $\frac{1}{2}\lambda + \lambda = \frac{3}{2}\lambda$ , or, in general,

by  $\frac{1}{2}\lambda + m\lambda = (2m+1)\frac{\lambda}{2}$ , that is, by any *odd* multiple of  $\frac{\lambda}{2}$ .

Wave or velocities.

11. A like construction to the one just adopted for the displacements of the particles at any given instant, may be also applied for exhibiting graphically their velocities at the same instant. Erect at the various points  $a, b, c$ , &c., perpendiculars to the line joining them, of lengths proportional to and in the direction of their velocities, and draw a line through the extreme points of these perpendiculars; this line will answer the purpose required. It is indicated by dots in the previous figure, and manifestly forms a wave of the same length as the wave of displacements, but the highest and lowest points of the one wave correspond to the points in which the other wave crosses the line of equilibrium.

Waves for longitudinal vibrations.

12. In order to a graphic representation of the displacements and velocities of particles vibrating *longitudinally*, it is convenient to draw the lines which represent those quantities, not in the actual direction in which the motion takes place and which coincides with the line  $abc$ ..., but at right angles to it, ordinates drawn upwards indicating displacements or velocities to the right (*i.e.*, in the direction of transmission of the disturbance), and ordinates drawn downwards indicating displacements or velocities in the opposite direction. When this is done, waves of displacement and velocity are figured identically with those for transversal vibrations, and are therefore subject to the same resulting laws.

Propagation of waves.

13. But not only will the above waves enable us to see at a glance the circumstances of the vibratory motion at the instant of time for which it has been constructed, but also for any subsequent moment. Thus, if we desire to consider what is going on after an interval  $\frac{T}{p}$ , we have

simply to conceive the whole wave (whether of displacement or velocity) to be moved to the right through a distance  $=ab$ . Then the state of motion in which  $a$  was before will have been transferred to  $b$ , that of  $b$  will have been transferred to  $c$ , and so on. At the end of another such interval, the state of the particles will in like manner be represented by the wave, if pushed onward through another equal space. In short, the whole circumstances may be pictured to the eye by two waves (of displacement

and of velocity) advancing continuously in the line  $abc$ ... with a velocity  $V$  which will take it over the distance  $ab$  in the time  $\frac{T}{p}$ ,  $V$  being therefore  $=\frac{ab}{\frac{T}{p}} = \frac{p \cdot ab}{T} = \frac{AC}{T}$  or  $V = \frac{\lambda}{T}$ .

This is termed the velocity of propagation of the wave, and, as we see, is equal to the length of the wave divided by the time of a complete vibration of each particle.

If, as is usually more convenient, we express  $T$  in terms of the number  $n$  of complete vibrations performed in a given time, say in the unit of time, we shall have  $\frac{1}{T} = n$ .

and hence

$$V = n\lambda.$$

14. There is one very important distinction between the two cases of longitudinal and of transversal vibrations which now claims our attention, viz., that whereas vibrations of the latter kind, when propagated from particle to particle in an elastic medium, do not alter the relative distances of the particles, or, in other words, cause no change of density throughout the medium; longitudinal vibrations, on the other hand, by bringing the particles nearer to or further from one another than they are when undisturbed, are necessarily accompanied by alternate condensations and rarefactions.

Variations of density due to longitudinal vibrations.

Thus, in fig. 2, we see that at the instant to which that fig. refers, the displacements of the particles immediately adjoining  $a$  are equal and in the same direction; hence at that moment the density of the medium at  $a$  is equal to that of the undisturbed medium. The same applies to the points  $h, p$ , &c., in which the displacements are at their maxima and the velocities of vibration  $=0$ .

At any point, such as  $c$ , between  $a$  and  $A$ , the displacements of the two adjoining particles on either side are both to the right, but that of the *preceding* particle is now the greater of the two, and hence the density of the medium throughout  $aA$  exceeds the undisturbed density. So at any point, such as  $f$ , between  $A$  and  $h$ , the same result holds good, because now the displacements are to the left, but are in excess on the right side of the point  $f$ . From  $a$  to  $h$ , therefore, the medium is condensed.

From  $h$  to  $B$ , as at  $k$ , the displacements of the two particles on either side are both to the *left*, that of the preceding particle being, however, the greater. The medium, therefore, is here in a state of rarefaction. And in like manner it may be shown that there is rarefaction from  $B$  to  $p$ ; so that the medium is rarefied from  $h$  to  $p$ .

At  $A$  the condensation is a maximum, because the displacements on the two sides of that point are equal and both directed towards  $A$ . At  $B$ , on the other hand, it is the rarefaction which is a maximum, the displacements on the right and left of that point being again equal, but directed outwards from  $B$ .

It clearly follows from all this that, if we trace a curve of which any ordinate shall be proportional to the difference between the density of the corresponding point of the disturbed medium and the density of the undisturbed medium—ordinates drawn upwards indicating condensation, and ordinates drawn downwards rarefaction—that curve will cross the line of rest of the particles  $abc$ ... in the same points as does the curve of velocities, and will therefore be of the same length  $\lambda$ , and will also rise above that line and dip below it at the same parts. But the connection between the *wave* of condensation and rarefaction and the wave of velocity, is still more intimate, when the extent to which the particles are displaced is very small, as is always the case in acoustics. For it may be shown that then the degree of condensation or rarefaction at any point of the medium is proportional to the velocity of vibration at that point. The same ordinates, therefore, will repre



sent the degrees of condensation, which represent the velocities, or, in other words, the wave of condensation and rarefaction may be regarded as coincident with the velocity wave.

## PART II.

*Velocity of propagation of waves of longitudinal disturbance through any elastic medium.*

Velocity of  
a wave.

15. Sir Isaac Newton was the first who attempted to determine, on theoretical grounds, the velocity of sound in air and other fluids. The formula obtained by him gives, however, a numerical value, as regards air, falling far short of the result derived from actual experiment; and it was not till long afterwards, when Laplace took up the question, that complete coincidence was arrived at between theory and observation. We are indebted to the late Professor Rankine, of Glasgow (*Phil. Trans.* 1870, p. 277), for a very simple and elegant investigation of the question, which we will here reproduce in an abridged form.

Let us conceive the longitudinal disturbance to be propagated through a medium contained in a straight tube having a transverse section equal to unity, but of indefinite length.

Let two transverse planes  $A_1$ ,  $A_2$  (fig. 3) be conceived as moving along the interior of the tube in the same direction and with the same velocity  $V$  as the disturbance-wave itself.

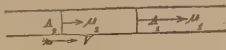


Fig. 3.

Let  $u_1$ ,  $u_2$  be the velocities of displacement of the particles of the medium at  $A_1$ ,  $A_2$  respectively, at any given instant, estimated in the same direction as  $V$ ; and  $\rho_1$ ,  $\rho_2$  the corresponding densities of the medium.

The disturbances under consideration, being such as preserve a permanent type throughout their propagation, it follows that the quantity of matter between  $A_1$  and  $A_2$  remains constant during the motion of these planes, or that as much must pass into the intervening space through one of them as issues from it through the other. Now at  $A_1$  the velocity of the particles relatively to  $A_1$  itself is  $V - u_1$ , inwards, and consequently there flows into the space  $A_1$ ,  $A_2$  through  $A_1$  a mass  $(V - u_1)\rho_1$  in the unit of time.

Forming a similar expression as regards  $A_2$ , putting  $m$  for the invariable mass through which the disturbance is propagated in the unit of time, and considering that if  $\rho$  denote the density of the undisturbed medium,  $m$  is evidently equal to  $V\rho$ , we have—

$$V - u_1 \rho_1 = (V - u_2) \rho_2 = V\rho = m. \quad (1.)$$

Now,  $p_1$ ,  $p_2$  being the pressures at  $A_1$ ,  $A_2$  respectively, and therefore  $p_2 - p_1$  the force generating the acceleration  $u_2 - u_1$ , in unit of time, on the mass  $m$  of the medium, by the second law of motion,

$$p_2 - p_1 = m(u_2 - u_1) \quad (2.)$$

Eliminating  $u_1$ ,  $u_2$  from these equations, and putting for  $\frac{1}{\rho_1}$ ,  $\frac{1}{\rho_2}$ ,  $\frac{1}{\rho}$  the symbols  $s_1$ ,  $s_2$ ,  $s$  (which therefore denote the volumes of the unit of mass of the disturbed medium at  $A_1$ ,  $A_2$ , and of the undisturbed medium), we get:

$$m^2 = \frac{p_2 - p_1}{s_1 - s_2} \quad \text{and} \quad V^2 = s^2 \frac{p_2 - p_1}{s_1 - s_2}$$

Now, if (as is generally the case in sound) the changes of pressure and volume occurring during the disturbance of the medium are very small, we may assume that these changes are proportional one to the other. Hence, denoting the ratio which any increase of pressure bears to the diminution of the unit of volume of the substance, and

which is termed the *elasticity* of the substance, by  $e$ , we shall obtain for the velocity of a wave of longitudinal displacements, supposed small, the equation:

$$V = \sqrt{\frac{es}{\rho}} \quad \text{or} \quad V = \sqrt{\frac{e}{\rho}} \quad (I.)$$

16. In applying this formula to the determination of Laplace's the velocity of sound in any particular medium, it is correction. requisite, as was shown by Laplace, to take into account the thermic effects produced by the condensations and rarefactions which, as we have seen, take place in the substance. The heat generated during the sudden compression, not being conveyed away, raises the value of the elasticity above that which otherwise it would have, and which was assigned to it by Sir Isaac Newton.

Thus, in a perfect gas, it is demonstrable by the principles of THERMODYNAMICS, that the elasticity  $e$ , which, in the undisturbed state of the medium, would be simply equal to the pressure  $p$ , is to be made equal to  $\gamma p$ , where  $\gamma$  is a number exceeding unity and represents the ratio of the specific heat of the gas under constant pressure to its specific heat at constant volume.

Hence, as air and most other gases may be practically regarded as perfect gases, we have for them:

$$V = \sqrt{\gamma p s} = \sqrt{\frac{\gamma p}{\rho}} \quad (II.)$$

17. From this the following inference may be drawn:—The velocity of sound in a given gas is unaffected by change of pressure if unattended by change of temperature.

For, by Boyle's law, the ratio  $\frac{p}{\rho}$  is constant at a given temperature. The accuracy of this inference has been confirmed by recent experiments of Regnault.

18. To ascertain the influence of change of temperature on the velocity of sound in a gas, we remark that, by Gay Lussac's law, the pressure of a gas at different temperatures varies proportionally both to its density  $\rho$  and to  $1 + \alpha t$ , where  $t$  is the number of degrees of temperature above freezing point of water ( $32^\circ$  Fahr.), and  $\alpha$  is the expansion of unit of volume of the gas for every degree above  $32^\circ$ .

If, therefore,  $p_1$ ,  $p_2$ ,  $\rho_1$ ,  $\rho_2$  denote the pressures and densities corresponding to temperatures  $32^\circ + t^\circ$  and  $32^\circ$ , we have:

$$\frac{p_2}{\rho_2} = \frac{p_1}{\rho_1} (1 + \alpha t)$$

and hence, denoting the corresponding velocities of sound by  $V_1$ ,  $V_2$ , we get

$$\frac{V_2}{V_1} = \sqrt{1 + \alpha t}$$

whence,  $\alpha$  being always a very small fraction, is obtained very nearly:

$$\frac{V_2}{V_1} = 1 + \frac{\alpha}{2} t \quad \text{and} \quad V - V_0 = \frac{\alpha}{2} t V_0$$

The velocity increases, therefore, by  $\frac{\alpha}{2} V_0$  for every degree of rise of temperature above  $32^\circ$ .

19. The general expression for  $V$  given in (II.) may be put in a different form: if we introduce a height  $H$  of the gas, regarded as having the same density  $\rho$  throughout and exerting the pressure  $p$ , then  $p = g\rho H$ , where  $g$  is the acceleration of gravity, and there results:

$$V = \sqrt{gH} \quad (III.)$$

Now  $\sqrt{gH}$  or  $\sqrt{2g \cdot \frac{H}{2}}$  is the velocity  $U$  which would be acquired by a body falling in *vacuo* from a height  $\frac{H}{2}$ . Hence  $V = U\sqrt{\gamma}$ .

If  $\gamma$  were equal to 1,  $V = U$ , which is the result obtained by Newton, and would indicate that the velocity of sound in a gas equals the velocity of a body falling from a height equal to half of that of a homogeneous atmosphere of the gas.

Numerical value of  $V$  in air. 20. In common dry air at  $32^\circ$  Fahr.,  $g$  being  $32.2$  ft., and the mercurial barometer 30 ins. or  $2.5$  ft., the density of air is to that of mercury as  $1:10,485.6$ ; hence  $H = 10,485.6 \times 2.5$  ft. =  $26,214$  ft.

$$\text{Also } \gamma = 1.408$$

$$\text{Hence } V_0 = \sqrt{1,408 \times 32.2 \times 26,214} = 1090 \text{ ft.}$$

and, by § 18, the increase of velocity for each degree of rise

of temperature ( $\alpha$  being  $\frac{1}{491}$ ) is  $\frac{1090}{982}$  or  $\frac{545}{491} = 1.110$  ft.

$\frac{1}{9}$  ft. very nearly.

in different gases. 21. If the value of  $\gamma$  were the same for different gases, it is obvious from formula  $V = \sqrt{\gamma \frac{P}{\rho}}$  that, at a given

temperature, the velocities of sound in those gases would be to each other inversely as the square roots of their densities. Regnault has found that this is so for common air, carbonic acid, nitrous oxide, hydrogen and ammoniacal gas (though less so as regards the two last).

22. The experimental determination of the velocity of sound in air has been carried out by ascertaining accurately the time intervening between the flash and report of a gun as observed at a given distance, and dividing the distance by the time. A discussion of the many experiments conducted on this principle in various countries and at various periods, by Van Der Kolk (*Lond. and Edin. Phil. Mag.*, July 1865), assigns to the velocity of sound in dry air at  $32^\circ$  Fahr., 1091 ft. 8 in. per second, with a probable error of  $\pm 3.7$  ft.; and still more recently (in 1871) Mr Stone, the Astronomer Royal at the Cape of Good Hope, has found 1090.6 as the result of careful experiments by himself there. The coincidence of these numbers with that we have already obtained theoretically sufficiently establishes the general accuracy of the theory.

23. Still it cannot be overlooked that the formula for  $V$  is founded on assumptions which, though approximately, are not strictly correct. Thus, the air is not a perfect gas, nor is the variation of elastic force, caused by the passage through it of a wave of disturbance always very small in comparison with the elastic force of the undisturbed air. Earnshaw (1858) first drew attention to these points, and came to the conclusion that the velocity of sound increases with its loudness, that is, with the violence of the disturbance. In confirmation of this statement, he appeals to a singular fact, viz., that, during experiments made by Captain Parry, in the North Polar Regions, for determining the velocity of sound, it was invariably found that the report of the discharge of cannon was heard, at a distance of  $2\frac{1}{2}$  miles, perceptibly earlier than the sound of the word fire, which, of course, preceded the discharge.

As, in the course of propagation in unlimited air, there is a gradual decay in the intensity of sound, it would follow that the velocity must also gradually decrease as the sound proceeds onwards. This curious inference has been verified experimentally by Regnault, who found the velocity of sound to have decreased by 2.2 ft. per second in passing from a distance of 4000 to one of 7500 feet.

24. Among other interesting results, derived by the accurate methods adopted by Regnault, but which want of space forbids us to describe, may be mentioned the dependence of the velocity of sound on its pitch, lower notes being, *cet. par.*, transmitted at a more rapid rate than higher ones. Thus, the fundamental note of a trumpet travels faster than its harmonies.

25. The velocity of sound in liquids and solids (the displacements being longitudinal), may be obtained by formula (I.), neglecting the thermic effects of the compressions and expansions as being comparatively inconsiderable, and may be put in other forms:

Thus, if we denote by  $s$  the change in length of one foot of a column of the substance produced by its own weight  $w$ , then  $s$  being  $= \frac{w}{\rho}$  or  $\frac{g\rho}{\rho}$ , we have  $\frac{s}{\rho} = \frac{g}{\rho}$  and hence:

$$V = \sqrt{\frac{g}{s}} \quad \text{(IV.)}$$

or, replacing  $\frac{1}{s}$  (which is the length in feet of a column that would be increased 1 foot by the weight of 1 cubic foot) by  $\frac{1}{l}$ ,  $V = \sqrt{gl}$

which shows that the velocity is that due to a fall through  $\frac{l}{2}$ .

Or, again, in the case of a liquid, if  $\eta$  denote the change of volume, which would be produced by an increase of pressure equal to one atmosphere, or to that of a column  $H$  of the liquid, since  $s$  is the change of volume due to weight of a column  $l$  of the liquid, and  $\therefore \frac{s}{\rho} = \frac{H}{\rho}$  and  $\frac{1}{s} = \frac{H}{\rho}$ , we get

$$V = \sqrt{\frac{gH}{\eta}} \quad \text{(VI.)}$$

Ex. 1. For water,  $\frac{1}{\eta} = 20,000$  very nearly;  $H = 34$  ft.  $V$  in water.

and hence  $V = 4680$  feet.

This number coincides very closely with the value obtained, whether by direct experiment, as by Colladon and Sturm on the Lake of Geneva in 1826, who found 4708, or by indirect means which assign to the velocity in the water of the River Seine at  $59^\circ$  Fahr. a velocity of 4714 ft. (Wertheim).

Ex. 2. For iron. Let the weight necessary to double  $V$  in iron.

the length of an iron bar be 4260 millions of lbs. on the square foot. Then a length  $l$  will be extended to  $l+1$  by a force of  $\frac{4260 \text{ millions lbs.}}{l}$  on the sq. ft. This, therefore,

by our definition of  $l$ , must be the weight of a cubic foot of the iron. Assuming the density of iron to be 7.8, and  $62.32$  lbs. as the weight of a cubic foot of water, we get  $7.8 \times 62.32$  or 486 lbs. as the weight of an equal bulk of iron. Hence  $\frac{4260 \text{ millions}}{l} = 486$  and  $l = \frac{4260}{486}$  millions,

$$\text{which gives } V = \sqrt{gl} = \sqrt{\frac{32.2 \times 4260}{486} \text{ millions}} \\ = \sqrt{\frac{4260}{15} \times 1000} = 1000 \sqrt{284}$$

or  $V = 17,000$  feet per second nearly.

As in the case of water and iron, so, in general, it may be stated that sound travels faster in liquids than in air, and still faster in solids, the ratio  $\frac{c}{p}$  being least in gases and greatest in solids.

26. Biot, about 50 years ago, availed himself of the great difference in the velocity of the propagation of sound through metals and through air, to determine the ratio of the one velocity to the other. A bell placed near one extremity of a train of iron pipes forming a joint length of upwards of 3000 feet, being struck at the same instant as the same extremity of the pipe, a person placed at the other extremity heard first the sound of the blow on the pipe, conveyed through the iron, and then, after an interval



of time, which was noted as accurately as possible, the sound of the bell transmitted through the air. The result was a velocity for the iron of 10.5 times that in air. Similar experiments on iron telegraph wire, made more recently near Paris by Wertheim and Breguet, have led to an almost identical number. Unfortunately, owing to the metal in those experiments not forming a continuous whole, and to other causes, the results obtained, which fall short of those otherwise found, cannot be accepted as correct.

Other means therefore, of an indirect character, to which we will refer hereafter, have been resorted to for determining the velocity of sound in solids. Thus Wertheim, from the pitch of the lowest notes produced by longitudinal friction of wires or rods, has been led to assign to that velocity values ranging, in different metals, from 16,822 feet for iron, to 4030 for lead, at temperature 68° Fahr., and which agree most remarkably with those calculated by means of the formula  $V = \sqrt{\frac{E}{\rho}}$ . He points out, however, that these values refer only to solids whose cross dimensions are small in comparison with their length, and that in order to obtain the velocity of sound in an unlimited solid mass, it is requisite to multiply the value as above found by  $\sqrt{\frac{3}{2}}$  or  $\frac{3}{2}$  nearly. For while, in a solid bar, the extensions and contractions due to any disturbance take place laterally as well as longitudinally; in an extended solid, they can only occur in the latter direction, thus increasing the value of  $e$ .

27. To complete the discussion of the velocity of the propagation of sound, we have still to consider the case of transversal vibrations, such as are executed by the points of a stretched wire or cord when drawn out of its position of rest by a blow, or by the friction of a violin-bow.

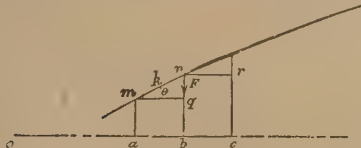


Fig. 4.

Let  $ac$  (fig. 4) be the position of the string when undisturbed,  $mnp$  when displaced. We will suppose the amount of displacement to be very small, so that we may regard the distance between any two given points of it as remaining the same, and also that the tension  $P$  of the string is not changed in its amount, but only in its direction, which is that of the string.

Take any origin  $o$  in  $ac$ , and  $ab = bc = \delta x$  (a very small quantity), then the perpendiculars  $am$ ,  $bn$ ,  $cp$ , are the displacements of  $abc$ . Let  $k$ ,  $l$  be the middle points of  $mn$ ,  $np$ ; then  $kl$  (which =  $mn$  or  $ab$  very nearly) may be regarded as a very small part of the string acted on by two forces each =  $P$ , and acting at  $n$  in the directions  $np$ ,  $nm$ . These give a component parallel to  $ac$ , which on our supposition is negligible, and another  $F$  along  $nb$ , such that

$$F = P (\sin \theta - \sin \theta') = P \cdot \left( \frac{nq}{mn} - \frac{pr}{np} \right) = P \cdot \frac{nq - pr}{\delta x}$$

Now if  $c$  = a length of string of weight equal to  $P$ , and the string be supposed of uniform thickness and density, the weight of  $kl = \frac{P}{c} \cdot kl = \frac{P}{c} \cdot \delta x$ , and the mass  $m$  of  $kl = \frac{P}{g} \cdot \delta x$ .

Hence the acceleration  $f$  in direction  $nb$  is—

$$f = \frac{F}{m} = g \cdot \frac{nq - pr}{\delta x^2}$$

1—28

If we denote  $ma$  by  $y$ ,  $oa$  by  $x$ , and the time by  $t$ , we shall readily see that this equation becomes ultimately,

$$\frac{d^2 y}{dx^2} = g \cdot c \cdot \frac{d^2 y}{dx^2}$$

which is satisfied by putting

$$y = \phi(x + \sqrt{gc} \cdot t) + \psi(x - \sqrt{gc} \cdot t)$$

where  $\phi$  and  $\psi$  indicate any functions.

Now we know that if for a given value of  $t$ ,  $x$  be increased by the length  $\lambda$  of the wave, the value of  $y$  remains unchanged; hence,

$$\phi(x + \sqrt{gc} \cdot t) + \delta c = \phi(x + \lambda + \sqrt{gc} \cdot t) + \delta c$$

But this condition is equally satisfied for a given value of  $x$ , by increasing  $\sqrt{gc} \cdot t$  by  $\lambda$ , i.e., increasing  $t$  by  $\frac{\lambda}{\sqrt{gc}}$ .

This therefore must =  $T$  (the time of a complete vibration of any point of the string). But  $V = \frac{\lambda}{T}$ . Hence,

$$V = \sqrt{gc} \quad \dots \quad (VII.)$$

is the expression for the velocity of sound when due to very small transversal vibrations of a thin wire or chord, which velocity is consequently the same as would be acquired by a body falling through a height equal to one half of a length of the chord such as to have a weight equal to the tension.

The above may also be put in the form—

$$V = \sqrt{\frac{gP}{w}}$$

where  $P$  is the tension, and  $w$  the weight of the unit of length of the chord.

28. It appears then that while sound is propagated by longitudinal vibrations through a given substance with the same velocity under all circumstances, the rate of its transmission by transversal vibrations through the same substance depends on the tension and on the thickness. The former velocity bears to the latter the ratio of  $\sqrt{l} : \sqrt{c}$ , (where  $l$  is the length of the substance, which would be lengthened one foot by the weight of one foot, if we take the foot as our unit) or of  $\sqrt{\frac{l}{c}} : 1$ , that is, of the square root of the length which would be extended one foot by the weight of  $c$  feet, or by the tension, to 1. This, for ordinary tensions, results in the velocity for longitudinal vibrations being very much in excess of that for transversal vibrations.

29. It is a well known fact that, in all but very exceptional cases, the loudness of any sound is less as the distance increases between the source of sound and the ear. The law according to which this decay takes place is the same as obtains in other natural phenomena, viz., that in an unlimited and uniform medium the loudness or intensity of the sound proceeding from a very small sounding body (strictly speaking, a point) varies inversely as the square of the distance. This follows from considering that the ear  $AC$  receives only the conical portion  $OAC$  of the whole volume of sound emanating from  $O$ , and that in order that an ear  $BD$ , placed at a greater distance from  $O$ , may admit the same quantity, its area must be to that of  $AC$  as  $OB^2 : OA^2$ . But if  $A' = AC$  be situated at same distance as  $BD$ , the amount of sound received by it and by  $BD$  (and therefore by  $AC$ ) will be as the area of  $A^1$  or  $AC$  to that of  $BD$ . Hence, the intensities of the sound

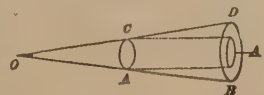


Fig. 5.

Law of decay of intensity of sounds with increased distance.

heard by the same ear at the distances OA and OB are to each other as  $OB^2$  to  $OA^2$ .

Influence of diminished density of the air on intensity of sound.

30. In order to verify the above law when the atmosphere forms the intervening medium, it would be necessary to test it at a considerable elevation above the earth's surface, the ear and the source of sound being separated by air of constant density. As the density of the air diminishes, we should then find that the loudness of the sound at a given distance would decrease; as is the case in the air-pump experiment previously described. This arises from the decrease of the quantity of matter impinging on the ear, and the consequent diminution of its *vis-viva*. The decay of sound due to this cause is observable in the rarefied air of high mountainous regions. De Saussure, the celebrated Alpine traveller, mentions that the report of a pistol at a great elevation appeared no louder than would a small cracker at a lower level.

But it is to be remarked that, according to Poisson, when air-strata of different densities are interposed between the source of sound and the ear placed at a given distance, the intensity depends only on the density of the air at the source itself; whence it follows that sounds proceeding from the surface of the earth may be heard at equal distances as distinctly by a person in a floating balloon as by one situated on the surface itself; whereas any noise originating in the balloon would be heard at the surface as faintly as if the ear were placed in the rarefied air on a level with the balloon. This was exemplified during a balloon ascent by Glaisher and Coxwell, who, when at an elevation of 20,000 feet, heard with great distinctness the whistle of a locomotive passing beneath them.

### PART III.

#### Reflexion and Refraction of Sound.

Laws of refraction.

31. When a wave of sound travelling through one medium meets a second medium of a different kind, the vibrations of its own particles are communicated to the particles of the new medium, so that a wave is excited in the latter, and is propagated through it with a velocity dependent on the density and elasticity of the second medium, and therefore differing in general from the previous velocity. The direction, too, in which the new wave travels is different from the previous one. This change of direction is termed *refraction*, and takes place according to the same laws as does the refraction of light, viz., (1.) The new direction or *refracted ray* lies always in the *plane of incidence*, or plane which contains the incident ray (i.e., the direction of the wave in the first medium), and the normal to the surface separating the two media, at the point in which the incident ray meets it; (2.) The *sine* of the angle between the normal and the incident ray bears to the *sine* of the angle between the normal and the refracted ray, a ratio which is constant for the same pair of media.

For a theoretical demonstration of these laws, we must refer to the art. OPTICS, where it will be shown that the ratio involved in the second law is always equal to the ratio of the velocity of the wave in the first medium to the velocity in the second; in other words, the *sines* of the angles in question are *directly* proportional to the velocities.

32. Hence sonorous rays, in passing from one medium into another, are bent in towards the normal, or the reverse, according as the velocity of propagation in the former exceeds or falls short of that in the latter. Thus, for instance, sound is refracted *towards* the perpendicular when passing into air from water, or into carbonic acid gas from air; the converse is the case when the passage takes place the opposite way.

33. It further follows, as in the analogous case of light,

that there is a certain angle termed the *limiting angle*, whose *sine* is found by dividing the less by the greater velocity, such that all rays of sound meeting the surface separating two different bodies will not pass onward; but suffer total reflexion back into the first body, if the velocity in that body is less than that in the other body, and if the angle of incidence exceeds the limiting angle.

The velocities in air and water being respectively 1090 and 4700 feet, the limiting angle for these media may be easily shown to be slightly above  $15\frac{1}{2}^\circ$ . Hence, rays of sound proceeding from a distant source, and therefore nearly parallel to each other, and to PO (fig. 6), the angle POM being greater than  $15\frac{1}{2}^\circ$ , will not pass into the water at all, but suffer total reflexion. Under such circumstances, the report of a gun, however powerful, would be inaudible by an ear placed in the water.

34. As light is concentrated into a focus by a convex glass lens (for which the velocity of light is less than for the air), so sound ought to be made to converge by passing through a convex lens formed of *carbonic acid gas*. On the other hand, to produce convergence with water or hydrogen gas, in both which the velocity of sound exceeds its rate in air, the lens ought to be *concave*. These results have been confirmed experimentally by Sondhaus and Hajeck, who also succeeded in verifying the law of the equality of the index of refraction to the ratio of the velocities of sound.

35. When a wave of sound falls on a surface separating two media, in addition to the refracted wave transmitted into the new medium, which we have just been considering, there is also a fresh wave formed in the new medium, and travelling in it in a different direction, but, of course, with the same velocity. This *reflected wave* is subject to the same laws as regulate the reflexion of light, viz., (1.) the coincidence of the planes of incidence and of reflexion, and (2.) the equality of the angles of incidence and reflexion, that is, of the angles made by the incident and reflected rays with the normal.

36. As in an ellipse (fig. 7), the normal PG at any point P bisects the angle SPH (S, H being the foci), rays of sound diverging from S, and falling on the spheroidal surface formed by the revolution of the ellipse about the longest diameter AB, will be reflected to H. Also, since  $SP + PH$  is always = AB, the times in which the different rays will reach H will all be equal to each other, and hence a crash at S will be heard as a crash at H.



Fig. 7.

37. At any point P of a parabola (fig. 8) of which S is the focus, and AX the axis, the normal PG bisects the angle SPX, PX being drawn parallel to AX.

Hence rays of sound diverging from S, and falling on the paraboloid formed by the revolution of the parabola about its axis, will all be reflected in directions parallel to the axis. And *vice versa* rays of sound XP, XQ, &c., from a very distant source, and parallel to the axis of a paraboloid, will be reflected into the focus. Consequently, if two reflecting paraboloids be placed at a considerable distance from and opposite to each other, with their axis coincident in direction (fig. 9), the tick of a watch placed at the focus S of one will be heard distinctly by an ear at S', the focus of the other.

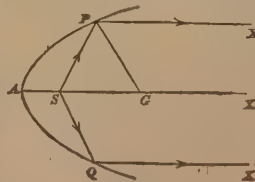


Fig. 8.

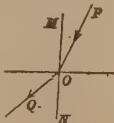


Fig. 6.

Refraction is to or from the normal according to relative values of the velocities. Limiting angle and total reflexion.

Acoustic lens.

Reflexion by a spheroid.

Reflexion by parabolic surfaces.



Echoes.

38. As a luminous object may give a succession of images when placed between two or more reflecting surfaces, so also in like circumstances may a sound suffer repetition.

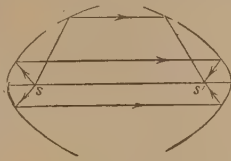


Fig. 9.

To these principles are easily traceable all the peculiarities of echoes. A wall or steep cliff may thus send back, somewhat reduced in intensity, a shout, the report of a pistol, &c. The time which elapses between the sound and its echo may be easily deduced from the known velocity of sound in air, if the distance of the wall be given. Thus, for a distance of 37 yards, the interval will be found by dividing the double of that or 74 yards by 370 yards, the velocity of sound at 50° Fahr., to amount to  $\frac{1}{5}$  of a second. Hence, if we assume that the rate at which syllables can be distinctly uttered is five per second, the wall must be at a distance exceeding 37 yards to allow of the echo of a word of one syllable reaching the ear *after* the word has been uttered, 74 yards for a word of *two* syllables, and so on.

If the reflecting surface consists of one or more walls, cliffs, &c., forming together a near approach in shape to that of a prolate spheroid or of a double parabolic surface, then two points may be found, at one of which if a source of sound be placed, there will be produced, by convergence, a distinct echo at the other. As examples of this may be mentioned the whispering gallery in St Paul's, London, and the still more remarkable case of the Cathedral of Girgenti in Sicily mentioned by Sir John Herschel.

Sound conveyed over water, &c.

39. On similar principles of repeated reflexion may be explained the well-known fact that sounds may be conveyed to great distances with remarkably slight loss of intensity, on a level piece of ground or smooth sheet of water or ice, and still more so in pipes, chimneys, tunnels, &c. Thus, in one of Captain Parry's Polar expeditions, a conversation was on one occasion carried on, at a distance of  $1\frac{1}{2}$  mile, between two individuals separated by a frozen sheet of water. M. Biot heard distinctly from one end of the train of pipes  $\frac{3}{4}$  of a mile long, previously referred to, a low whisper proceeding from the opposite end.

Practical illustrations are afforded by the system of communication by means of tubing now so extensively adopted in public and private buildings, and by the *speaking trumpet* and the *ear trumpet*.

Thunder.

40. The prolonged roll of thunder, with its manifold varieties, is partly to be ascribed to reflexion by mountains, clouds, &c.; but is mainly accounted for on a different acoustic principle, viz., the comparatively low rate of transmission of sound through air, as was first shown by Dr Hooke at the close of the 17th century. The explanation will be more easily understood by adverting to the case of a volley fired by a long line of troops. A person situated at a point in that line produced, will first it is evident hear the report of the nearest musket, followed by that of the one following, and so down to the last one in the line, which will close the prolonged roll thus reaching his ear; and as each single report will appear to him less intense according as it proceeds from a greater distance, the roll of musketry thus heard will be one of gradually decreasing loudness. But if he were to place himself at a relatively great distance right opposite to the centre of the line, the separate reports from each of the two wings would reach him nearly at the same moment, and hence the sound of the volley would now approach more nearly to that of a single loud crash. If the line of

soldiers formed an arc of a circle having its centre in his position, then the distances gone over by the separate reports being equal, they would reach his ear at the same absolute instant of time, and with exactly equal intensities; and the effect produced would be strictly the same as that of a single explosion, equal in violence to the sum of all the separate discharges, occurring at the same distance. It is easy to see that, by varying the form of the line of troops and the position of the observer, the sonorous effect will be diversified to any extent desired. If then we keep in view the great diversity of form exhibited by lightning-flashes, which may be regarded as being lines, at the points of which are generated explosions at the same instant of time, and the variety of distance and relative position at which the observer may be placed, we shall feel no difficulty in accounting for all those acoustic phenomena of thunder to which Hooke's theory is applicable.

#### PART IV.

##### *The Principles of Musical Harmony.*

41. A few words on the subject of *musical harmony*, must be introduced here for the immediate purposes of this article, further details being reserved for the special article on that subject.

Sounds in general exhibit three different qualities, so far as their effect on the ear is concerned, viz., *loudness*, *pitch*, and *timbre*.

Loudness depends, *cæt. par.*, on the violence with which the vibrating portions of the ear are excited; and therefore on the *extent* or *amplitude* of the vibrations of the body whence the sound proceeds. Hence, after a bell has been struck, its effect on the ear gradually diminishes as its vibration becomes less and less extensive. By the theory of vibrations, loudness or intensity is measured by the *vis-viva* of the vibrating particles, and is consequently proportional to the square of their maximum velocity or to the square of their maximum displacement. Helmholtz, however, in his remarkable work on the perception of tone, observes that notes differing in pitch differ also in loudness, where their *vis viva* is the same, the higher note always exhibiting the greater intensity.

Loudness depends on extent of vibration.

42. Difference of *pitch* is that which finds expression in the common terms applied to notes: *Acute, shrill, high, sharp, grave, deep, low, flat*. We will point out presently in what manner it is established that this quality of sound depends on the rapidity of vibration of the particles of air in contact with the external parts of the ear. The pitch of a note is higher in proportion to the number of vibrations of the air corresponding to it, in a given time, such as one second. If  $n$  denote this number, then, by § 13,  $n = \frac{V}{\lambda}$ , and hence,  $V$  being constant, the pitch is higher the less the length  $\lambda$  of the wave.

Pitch depends on rapidity of vibration.

43. *Timbre*, or, as it is termed by German authors, *Timbre, Klang-farbe*, rendered by Tyndall into *clang-colour* or *clang-tint*, but for which we would substitute the expression *acoustic colour*, denotes that peculiarity of impression produced on the ear by sounds otherwise, in pitch, loudness, &c., alike, whereby they are recognisable as different from each other. Thus human voices are readily interdistinguishable; so are notes of the same pitch and intensity, produced by different instruments. The question whence arises this distinction must be deferred for the present.

Timbre.

44. Besides the three qualities above mentioned, there exists another point in which sounds may be distinguished among each other, and which, though perhaps reducible to difference of timbre, requires some special remarks, viz., that by which sounds are characterised, either as *noises* or as *musical notes*. A musical note is the result of regular,

Distinction between noises and musical notes.

periodic vibrations of the air-particles acting on the ear, and therefore also of the body whence they proceed, each particle passing through the same phase at stated intervals of time. On the other hand, the motion to which noise is due is irregular and flitting, alternately fast and slow, and creating in the mind a bewildering and confusing effect of a more or less unpleasant character. Noise may also be produced by combining in an arbitrary manner several musical notes, as when one leans with the fore-arm against the keys of a piano. In fact, the composition of regular periodic motions, thus effected, is equivalent to an irregular motion.

Laws of musical harmony.

145. We now proceed to state the laws of musical harmony, and to describe certain instruments by means of which they admit of being experimentally established. The chief of these laws are as follow:—

Ratios of vibrations.

(1.) The notes employed in music always correspond to certain definite and invariable ratios between the numbers of vibrations performed in a given time by the air when conveying these notes to the ear, and these ratios are of a very simple kind, being restricted to the various permutations of the first four prime numbers 1, 2, 3, 5, and their powers.

Unison.

(2.) Two notes are in *unison* whose corresponding vibrations are executed exactly at the same rate, or for which (denoting by  $n_1, n_2$  the numbers per second)  $\frac{n_1}{n_2} = 1$ . This ratio or interval (as it is termed) is the simplest possible.

Octave.

(3.) The next interval is that in which  $\frac{n_1}{n_2} = 2$ , and is termed the *octave*.

Twelfth and Fifth

(4.) The interval  $\frac{n_1}{n_2} = 3$  is termed the *twelfth*, and if we reduce the higher note of the pair by an 8<sup>th</sup>, i.e., divide its number of vibrations by 2, we obtain the interval  $\frac{n_2}{n} = \frac{3}{2}$ , designated as the interval of the *fifth*.

Major third.

(5.) The interval  $\frac{n_1}{n_2} = 5$  has no particular name attached to it, but if we lower the higher note by two 8<sup>ths</sup> or divide  $n_1$  by 4, we get the interval  $\frac{n_1}{n_2} = \frac{5}{4}$ , or the interval of the *major third*.

Major sixth.  
Minor third.

(6.) The interval  $\frac{n_1}{n_2} = \frac{5}{3}$  is termed the *major sixth*.

(7.) The interval  $\frac{n_1}{n_2} = \frac{2 \times 3}{5} = \frac{6}{5}$  is termed the *minor third*.

Fourth.

(8.) The interval  $\frac{n_1}{n_2} = \frac{2 \times 2}{3} = \frac{4}{3}$  is termed the *fourth*.

Second.

(9.) The interval  $\frac{9}{8}$  which, being  $-\frac{3}{2} \times \frac{3}{2}$ , may be regarded as formed by taking in the first place a note one-fifth higher than the key-note or fundamental, i.e., higher than the latter by the interval  $\frac{3}{2}$ , thence ascending by another fifth, which gives us  $\frac{3}{2} \times \frac{3}{2}$  and lowering this by an octave, which results in  $\frac{9}{8}$ , which is called the *second*.

Seventh.

(10.) The interval  $\frac{15}{8}$  or  $\frac{3}{2} \times \frac{5}{4}$  may be regarded as the *major third* ( $\frac{5}{4}$ ) of the *fifth* ( $\frac{3}{2}$ ), and is called the interval of the *seventh*.

Pianistic scale.

46. If the key-note or fundamental be denoted by C, and the notes, whose intervals above C are those just enumerated, by D, E, F, G, A, B, C, we form what is

known in music as the *natural* or *diatonic* scale, in which therefore the intervals reckoned from C are successively

$$\begin{matrix} 9 & 5 & 4 & 3 & 5 & 15 \\ 8' & 2' & 3' & 2' & 3' & 8' \end{matrix}, 2.$$

and therefore the intervals between each note and the one following are

$$\begin{matrix} 9 & 10 & 16 & 9 & 10 & 9 & 16 \\ 8' & 9' & 15' & 8' & 9' & 8' & 15' \end{matrix}.$$

Of these last intervals the *first, fourth, and sixth* are *Major tone*. each  $= \frac{9}{8}$ , which is termed a *major tone*. The *second* and *Minor tone*

*fifth* are each  $= \frac{10}{9}$ , which is a ratio slightly less than the former, and hence is called a *minor tone*. The *third* and *seventh* are each  $= \frac{16}{15}$ , to which is given the name of *semi-tone*.

By interposing an additional note between each pair of notes whose interval is a major or a minor tone, the resulting series of notes may be made to exhibit a nearer approach to equality in the intervals successively separating them, which will be very nearly *semi-tones*. This sequence of twelve notes forms the *chromatic* scale. The note interposed between C and D is either C sharp ( $C\sharp$ ) or D flat (Db), according as it is formed by *raising* C a semi-tone or *lowering* D by the same amount.

47. Various kinds of apparatus have been contrived with a view of confirming experimentally the truth of the laws of musical harmony as above stated.

Savart's toothed wheel apparatus consists of a brass wheel, whose edge is divided into a number of equal projecting teeth distributed uniformly over the circumference and which is capable of rapid rotation about an axis perpendicular to its plane and passing through its centre, by means of a series of multiplying wheels, the last of which is turned round by the hand. The toothed wheel being set in motion, the edge of a card or of a funnel-shaped piece of common note paper is held against the teeth, when a note will be heard arising from the rapidly succeeding displacements of the air in its vicinity. The pitch of this note will, agreeably to the theory, rise as the rate of rotation increases, and becomes steady when that rotation is maintained uniform. It may thus be brought into unison with any sound of which it may be required to determine the corresponding number of vibrations per second, as for instance the note A<sub>3</sub>, three 8<sup>ths</sup> higher than the A which is indicated musically by a small circle placed between the second and third lines of the G clef, which A is the note of the tuning-fork usually employed for regulating concert-pitch. A<sub>3</sub> may be given by a piano. Now, suppose that the note produced with Savart's apparatus is in unison with A<sub>3</sub>, when the experimenter turns round the first wheel at the rate of 60 turns per minute or one per second, and that the circumferences of the various multiplying wheels are such that the rate of revolution of the toothed wheel is thereby increased 44 times, then the latter wheel will perform 44 revolutions in a second, and hence, if the number of its teeth be 80, the number of taps imparted to the card every second will amount to 44 × 80 or 3520. This, therefore, is the number of vibrations corresponding to the note A<sub>3</sub>. If we divide this by 2<sup>3</sup> or 8, we obtain 440 as the number of vibrations answering to the note A. This, however, tacitly assumes that the bands by which motion is transmitted from wheel to wheel do not slip during the experiment. If, as is always more or less the case, slipping occurs, a different mode for determining the rate at which the toothed wheel revolves, such as is employed in the siren of De la Tour (*vide* below), must be adopted.



If, for the single toothed wheel, be substituted a set of four with a common axis, in which the teeth are in the ratios 4 : 5 : 6 : 8, and if the card be rapidly passed along their edges, we shall hear distinctly produced the fundamental chord C, E, G, C, and shall thus satisfy ourselves that the intervals C, E; C, G, and C, C, are (as they ought to be)  $\frac{5}{4}$ ,  $\frac{3}{2}$ , and 2 respectively.

Seebeck's syren.

48. The syren of Seebeck is the simplest form of apparatus thus designated, and consists of a large circular disc of pasteboard mounted on a central axis, about which it may be made to revolve with moderate rapidity. This disc is perforated with small round holes arranged in circles about the centre of the disc. In the first series of circles, reckoning from the centre, the openings are so made as to divide the respective circumferences, on which they are found, in aliquot parts bearing to each other the ratios of the numbers 2, 4, 5, 6, 8, 10, 12, 16, 20, 24, 32, 40, 48, 64. The second series consists of circles each of which is formed of two sets of perforations, in the first circle arranged as 4 : 5, in the next as 3 : 4, then as 2 : 3, 3 : 5, 4 : 7. In the outer series is a circle divided by perforations into four sets, the numbers of aliquot parts being as 3 : 4 : 5 : 6, followed by others which we need not further refer to.

The disc being started, then by means of a tube held at one end between the lips, and applied near to the disc at the other, or more easily with a common bellows, a blast of air is made to fall on the part of the disc which contains any one of the above circles. The current being alternately transmitted and shut off, as a hole passes on and off the aperture of the tube or bellows, causes a vibratory motion of the air, whose rapidity depends on the number of times per second that a perforation passes the mouth of the tube. Hence the note produced with any given circle of holes rises in pitch as the disc revolves more rapidly; and if, the revolution of the disc being kept as steady as possible, the tube be passed rapidly across the circles of the first series, the notes heard are found to produce on the ear, as required by theory, the exact impression corresponding to the ratios 2 : 4 : &c., i.e., of a series of notes, which, if the lowest be denoted by C, form the sequence C C<sub>1</sub> E<sub>1</sub> G<sub>1</sub> C<sub>2</sub> &c., &c. In like manner, the first circle in which we have two sets of holes dividing the circumference, the one into say 8 parts, and the other into 10, or in ratio 4 : 5, the note produced is a compound one, such as would be obtained by striking on the piano two notes separated by the interval of a major third ( $\frac{5}{4}$ ). Similar results, all agreeing with the theory, are obtainable by means of the remaining perforations.

A still simpler form of syren may be constituted with a good spinning top, a perforated card disc, and a tube for blowing with.

Syren of C. de la Tour.

49. The syren of Cagnard de la Tour is founded on the same principle as the preceding. It consists of a cylindrical chest of brass, the base of which is pierced at its centre with an opening in which is fixed a brass tube projecting outwards, and intended for supplying the cavity of the cylinder with compressed air or other gas, or even liquid. The top of the cylinder is formed of a plate perforated near its edge by holes distributed uniformly in a circle concentric with the plate, and which are cut obliquely through the thickness of the plate. Immediately above this fixed plate, and almost in contact with it, is another of the same dimensions, and furnished with the same number,  $n$ , of openings similarly placed, but passing obliquely through in an opposite direction from those in the fixed plate, the one set being inclined to the left, the other to the right.

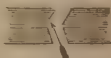


Fig. 10.

This second plate is capable of rotation about a steel axis perpendicular to its plane and passing through its centre. Now, let the movable plate be at any time in a position such that its holes are immediately above those in the fixed plate, and let the bellows by which air is forced into the cylinder (air, for simplicity, being supposed to be the fluid employed) be put in action; then the air in its passage will strike the side of each opening in the movable plate in an oblique direction (as shown in fig. 10), and will therefore urge the latter to rotation round its centre.

After  $\frac{1}{n}$ th of a revolution, the two sets of perforations will again coincide, the lateral impulse of the air repeated, and hence the rapidity of rotation increased. This will go on continually as long as air is supplied to the cylinder, and the velocity of rotation of the upper plate will be accelerated up to a certain maximum, at which it may be maintained by keeping the force of the current constant.

Now, it is evident that each coincidence of the perforations in the two plates is followed by a non-coincidence, during which the air-current is shut off, and that consequently, during each revolution of the upper plate, there occur  $n$  alternate passages and interceptions of the current. Hence arises the same number of successive impulses of the external air immediately in contact with the movable plate, which is thus thrown into a state of vibration at the rate of  $n$  for every revolution of the plate. The result is a note whose pitch rises as the velocity of rotation increases, and becomes steady when that velocity reaches its constant value. If, then, we can determine the number  $m$  of revolutions performed by the plate in every second, we shall at once have the number of vibrations per second corresponding to the audible note by multiplying  $m$  by  $n$ .

For this purpose the steel axis is furnished at its upper part with a screw working into a toothed wheel, and driving it round, during each revolution of the plate, through a space equal to the interval between two teeth. An index resembling the hand of a watch partakes of this motion, and points successively to the divisions of a graduated dial. On the completion of each revolution of this toothed wheel (which, if the number of its teeth be 100, will comprise 100 revolutions of the movable plate), a projecting pin fixed to it catches a tooth of another toothed wheel and turns it round, and with it a corresponding index which thus records the number of turns of the first toothed wheel. As an example of the application of this syren, suppose that the number of revolutions of the plate, as shown by the indices, amounts to 5400 in a minute of time, that is, to 90 per second, then the number of vibrations per second of the note heard amounts to 90 $n$ , or (if number of holes in each plate = 8) to 720.

50. Dove, of Berlin, has produced a modification of the syren by which the relations of different musical notes may be more readily ascertained. In it the fixed and movable plates are each furnished with four concentric series of perforations, dividing the circumferences into different aliquot parts, as *p. ex.*, 8, 10, 12, 16. Beneath the lower or fixed plate are four metallic rings furnished with holes corresponding to those in the plates, and which may be pushed round by projecting pins, so as to admit the air-current through any one or more of the series of perforations in the fixed plate. Thus, may be obtained, either separately or in various combinations, the four notes whose vibrations are in the ratios of the above numbers, and which therefore form the fundamental chord (CEGC<sub>1</sub>). The inventor has given to this instrument the name of the many-voiced syren.

51. Helmholtz has further adapted the syren for more extensive use, by the addition to Dove's instrument of another chest containing its own fixed and movable per-syren.

Helmholtz's double syren.

forated plates and perforated rings, both the moveable plates being driven by the same current and revolving about a common axis. Annexed is a figure of this instrument (fig. 11).

52. The relation between the pitch of a note and the frequency of the corresponding vibrations has also been studied by *graphic* methods. Thus, if an elastic metal slip or a pig's bristle be attached to one prong of a tuning-fork, and if the fork, while in vibration, is moved rapidly over a glass plate coated with lamp-black, the attached slip touching the plate lightly, a wavy line will be traced on the plate answering to the vibrations to and fro of the fork. The same result will be obtained with a stationary fork and a movable glass plate; and, if the time occupied by the plate in moving through a given distance can be ascertained, and the number of complete undulations exhibited on the plate for that distance, which is evidently the number of vibrations of the fork in that time, is reckoned, we shall have determined the numerical vibration-value of the note yielded by the fork. Or, if the same plate be moved in contact with two tuning-forks, we shall, by comparing the number of sinuosities in the one trace with that in the other, be enabled to assign the ratio of the corresponding numbers of vibrations per second. Thus, if the one note be an octave higher than the other, it will give double the number of waves in the same distance. The motion of the plate may be simply produced by dropping it between two vertical grooves, the tuning-forks being properly fixed to a frame above.

The Phon-  
auto-  
graph.

53. Greater accuracy may be attained with the so-called *Vibrograph* or *Phonautograph* (Duhamel's or Koenig's), consisting of a glass cylinder coated with lamp-black, or, better still, a metallic cylinder round which a blackened sheet of paper is wrapped. The cylinder is mounted on a horizontal axis and turned round, while the *pointer* attached to the vibrating body is in light contact with it, and traces therefore a wavy circle, which, on taking off the paper and flattening it, becomes a wavy straight line. The superiority of this arrangement arises from the comparative facility with which the number of revolutions of the cylinder in a given time may be ascertained. In Koenig's phonautograph, the axis of the cylinder is fashioned as a screw, which works in fixed nuts at the ends, causing a sliding as well as a rotatory motion of the cylinder. The lines traced out by the vibrating pointer are thus prevented from overlapping when more than one turn is given to the cylinder.

Any sound whatever may be made to record its trace on the paper by means of a large parabolic cavity resembling a speaking-trumpet, which is freely open at the wider extremity, but is closed at the other end by a thin stretched membrane. To the centre of this membrane is attached a small feather-fibre, which, when the reflector is suitably placed, touches lightly the surface of the revolving cylinder. Any sound (such as that of the human voice) transmitting its rays into the reflector, and communicating vibratory motion to the membrane, will cause the feather to trace a sinuous line on the paper. If, at the same time, a tuning-fork of known number of vibrations per second be made to trace its own line close to the other, a comparison of the two lines gives the number corresponding to the sound under consideration.

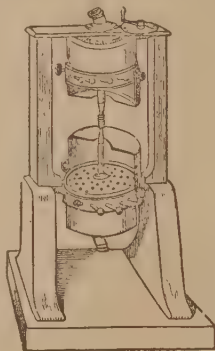


Fig. 11.

## PART V.

### Stationary Waves.

54. We have hitherto, in treating of the propagation of waves of sound, assumed that the medium through which it took place was unlimited in all directions, and that the source of sound was single. In order, however, to understand the principles of the production of sound by musical instruments, we must now direct our attention to the case of two waves from different sources travelling through the same medium in opposite directions. Any particle of the medium being then affected by two different vibrations at the same instant will necessarily exhibit a different state of motion from that due to either wave acting separately from the other, and we have to inquire what is the result of this mutual *interference* (as it is termed) of the two given waves. Supposing, as sufficient for our purpose, that the given waves are of equal lengths and of equal amplitudes, in other words, that the corresponding notes are of the same pitch and equally loud; and supposing, further, that they are advancing in exactly opposite directions, we shall now show that the result of the mutual interference of two such waves is the production of a *stationary wave*, that is, taking any line of particles of the medium along the direction of motion of

the component waves, certain of them, such as  $a, c, e \dots$  at intervals each  $= \frac{\lambda}{2}$  will remain constantly in their usual undisturbed positions. All the particles situated between  $a$  and  $c$  will vibrate (transversely or longitudinally, as the case may be) to and fro in the same direction as they would if affected by only one of the interfering waves, but with different amplitudes of vibration, ranging from zero at  $a$  to a maximum at  $b$  and thence to zero at  $c$ . Those between  $c$  and  $e$  will vibrate in like manner, but always in an opposite direction to the similarly placed particles in  $ac$ , and so on alternately.

The annexed figures will represent to the eye the states of motion at intervals of time  $= \frac{1}{4}$  of the time  $T$  of a complete vibration of the particles. In fig. 13, 1, the particles in

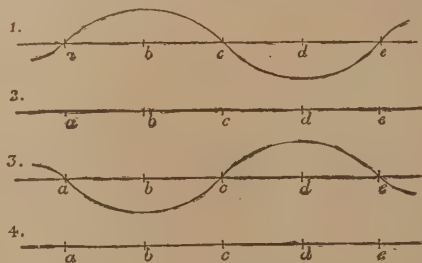


Fig. 13.

$ac$  are at their greatest distances from their undisturbed positions (*above or to the right*, according as the motion is *transversal or longitudinal*). In fig. 13, 2, they are all in their undisturbed positions. In fig. 13, 3, the displacements are all reversed relatively to fig. 13, 1. In fig. 13, 4, the particles are again passing through their equilibrium positions, resuming the positions indicated in fig. 13, 1, after the time  $T$ .

The points  $ac$ , &c., which remain stationary are termed *Nodes* and the vibrating parts between them *ventral segments*.

54a. *Proof.* In fig. 14, 1, the full curved line represents *Proof* the two interfering waves at an instant of time such that



in their progress towards each other, they are then coincident. It is obvious that the particles of the medium will at the moment in question be displaced to double the extent of the displacement producible by either wave alone, so that the *resultant* wave may be represented by the *dotted* curve. In fig. 14, 2, the two interfering waves, represented by the full and dotted curves respectively, have each

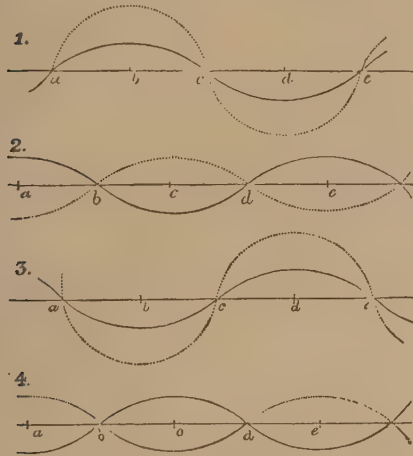


Fig. 14.

passed over a distance =  $\frac{1}{2} \lambda$ , the one to the right, the other to the left, and it is manifest that any disturbance of the medium, producible by the one wave, is completely neutralised by the equal and opposite action of the other. Hence, the particles of the medium are now in their undisturbed positions. In fig. 14, 3, a further advance of the two waves, each in its own direction, over a space =  $\frac{1}{2} \lambda$ , has again brought them into coincidence, and the result is the wave represented by the dotted line, which, it will be remarked, has its *crests*, where, in fig. 1, are found *troughs*. In fig. 14, 4, after a further advance =  $\frac{1}{2} \lambda$ , we have a repetition of the case of fig. 14, 2, the particles are now again unaffected by the waves. A still further advance of  $\frac{1}{2} \lambda$ , or of  $\lambda$  reckoned from the commencement, brings us back to the same state of things as subsisted in fig. 14, 1. An inspection and inter-comparison of the dotted lines in these figures are now sufficient to establish the accuracy of the laws, before mentioned, of *stationary waves*.

## PART VI.

### Musical Strings.

Musical strings.

55. We have in musical strings an instance of the occurrence of stationary waves.

Let AB (fig. 15) be a wire or string, supposed meanwhile to be fixed only at one extremity B, and let the wire be, at any part, excited (whether by passing a violin bow across or by friction along it), so that a wave (whether of transversal or longitudinal vibrations) is propagated thence towards B. On reaching this point, which is fixed, reflexion will occur, in consequence of which the particles there will suffer a complete reversal of velocity, just as when a perfectly elastic ball strikes against a smooth surface perpendicularly, it rebounds with a velocity equal and opposite to that it previously had. Hence, the displacement due to

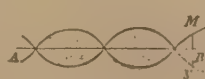


Fig. 15.

the incident wave being BM, the displacement after reflexion will be BN equal and opposite to BM, and a reflected wave will result, represented by the faint line in the fig., which will travel with the same velocity, but in the opposite direction to the incident wave fully lined in the fig. The interference of these two oppositely progressing waves will consequently give rise to a stationary wave (fig. 16), and if we take on the wire distances BC, CD, DE, &c. =  $\frac{1}{2} \lambda$ , the points B, C, D, E, ... will be *nodes*, each of which separate portions of the wire vibrating in opposite directions, i.e., *ventral segments*.

56. Now, it is obvious that, inasmuch as a node is a point which remains always at rest while other parts of the medium to which it belongs are vibrating, such point may be absolutely fixed without thereby interfering with the oscillatory motion of the medium. If, therefore, a length AB of wire be taken equal to any multiple of  $\frac{\lambda}{2}$ , A may be

fixed as well as B, the motion remaining the same as before; and thus we shall have the usual case of a musical string. The two extremities being now both fixed, there will be repeated reflexions at both, and a consequent persistence of two progressive waves advancing in opposite directions and producing together the stationary wave above figured.

57. We learn from this that a musical string is susceptible of an infinite variety of modes of vibration corresponding to different numbers of subdivision into ventral segments.

Thus, it may have but *one* ventral segment (fig. 17), or but two nodes formed by its fixed extremities. In this case, the note emitted by it is the lowest which can possibly be obtained from it, or, as it is called, its *fundamental* note. If  $l$  denote the length of the wire, by what has been already proved,  $l = \frac{\lambda}{2}$ , and therefore the length of the wave  $\lambda = 2l$ . Hence,  $V$  being the velocity of propagation of the wave through the wire, the number  $n$  of vibrations performed in the unit of time with the fundamental note is  $\frac{V}{2l}$ .

The next possible sub-division of the wire is into *two* ventral segments, the three nodes being the two fixed ends A, B, and the middle point C (fig. 18). Hence,  $l = \lambda$ , and the number of vibrations  $n = \frac{V}{l}$  or double of those of the fundamental. The note, therefore, now is an 8<sup>th</sup> higher.

Reasoning in a like manner for the cases of three, four, &c., ventral segments, we obtain the following general law, which is applicable alike to transversely and to longitudinally vibrating wires:

A wire or string fixed at both ends is capable of yielding, in addition to its fundamental note, any one of a series of notes corresponding to 2, 3, 4 times, &c., the number of vibrations per second of the fundamental, viz., the octave, twelfth, double octave, &c.

These higher notes are termed the *harmonics* or (by the Germans) the *overtones* of the string.

It is to be remarked that the overtones are in general fainter the higher they are in the series, because, as the number of ventral segments or independently vibrating parts of the string increases, the extent or amplitude of the vibrations diminishes.

58. Not only may the fundamental and its harmonics

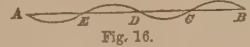


Fig. 16.

Fig. 17.



Fig. 18.

May be heard together.

be obtained independently of each other, but they are also to be heard simultaneously, particularly, for the reason just given, those that are lower in the scale. A practised ear easily discerns the coexistence of these various tones when a pianoforte or violin string is thrown into vibration. It is evident that, in such case, the string, while vibrating as a whole between its fixed extremities, is at the same time executing subsidiary oscillations about its middle point, its points of trisection, &c., as shown in fig. 19, for the fundamental and the first harmonic.



Fig. 19.

Harmonics, how best obtained.

59. The easiest means for bringing out the harmonics of a string consists in drawing a violin-bow across it near to one end, while the feathered end of a quill or a hair-pencil is held lightly against the string at the point which it is intended shall form a node, and is removed just after the bow is withdrawn. Thus, if a node is made in this way, at  $\frac{1}{2}$  of AB from A, the note heard will be the twelfth. If light paper rings be strung on the cord, they will be driven by the vibrations to the nodes or points of rest, which will thus be clearly indicated to the eye.

Comparison of fundamentals of strings vibrating transversely and longitudinally.

60. The formula  $n_1 = \frac{V}{2l}$  shows that the pitch of the fundamental note of a wire of given length rises with the velocity of propagation of sound through it. Now we have learned (§ 28) that this velocity, in ordinary circumstances, is enormously greater for a wire vibrating longitudinally than for the same wire vibrating transversely. The fundamental note, therefore, is far higher in pitch in the former than in the latter case.

As, however, the quantity V depends, for longitudinal vibrations, solely on the nature of the medium, the pitch of the fundamental note of a wire rubbed along its length depends—the material being the same, brass for instance—on its length, not at all on its thickness, &c.

But as regards strings vibrating transversely, such as are met with in our instrumental music, V, as we have seen (§ 27), depends not only on the nature of the substance used, but also on its thickness and tension, and hence the pitch of the fundamental, even with the same length of string, will depend on all those various circumstances.

Transversely vibrating string  $n \propto \frac{1}{l}$

61. If we put for V its equivalent expressions before given, we have for the fundamental note of transversely vibrating strings:

$$n = \frac{\sqrt{g\sigma}}{2l} \quad \text{or} \quad n = \frac{1}{2l} \sqrt{\frac{gP}{w}},$$

whence the following inferences may be easily drawn:

If a string, its tension being kept invariable, have its length altered, the fundamental note will rise in pitch in exact proportion with its diminished length, that is,  $n$  varies then inversely as  $l$ .

Hence, on the violin, by placing a finger successively on any one of the strings at  $\frac{8}{9}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ , we shall obtain notes corresponding to numbers of vibrations bearing to the fundamental the ratios to unity of the following, viz.,  $\frac{9}{8}, \frac{5}{4}, \frac{4}{3}, \frac{3}{2}, \frac{15}{8}, 2$ , which notes form, therefore, with the fundamental, the complete scale.

$n \propto \frac{1}{\sqrt{\text{Tension}}}$

62. By tightening a musical string, its length remaining unchanged, its fundamental is rendered higher. In fact, then,  $n$  is proportional to the square root of the tension. Thus, by quadrupling the tension, the note is raised an octave. Hence, the use of keys in tuning the violin, the pianoforte, &c.

$n \propto \frac{1}{\text{thickness}}$

63. Equal lengths of strings of the same density and equally stretched, but of different thicknesses, give funda-

mentals which are higher in pitch in proportion to diminution of thickness (i.e.,  $n$  varies inversely as the thickness). Thus, of two strings of same kind of gut, same length and same tension, if one be twice as thick as the other, its fundamental will be an octave lower. Hence, three of the strings of the violin, though all of gut, have different fundamentals, because unequally thick.

64. Equally long and equally stretched strings or wires of different thickness and different material, have fundamentals higher in pitch the less the weights of the strings;  $n$  here varies inversely as the square root of the weight  $w$  of a given length of the string.

65. If, in last case, the thicknesses of the strings  $n \propto \frac{1}{\sqrt{\text{density}}}$  which are to be compared together are equal, then  $n$  varies inversely as the square root of the density.

Hence, in the violin and in the pianoforte, the lower notes are obtained from wires formed of denser material. Thus, the fourth string of the violin is formed of gut covered with silver wire.

66. A highly ingenious and instructive method for illustrating the above laws of musical strings, has been recently contrived by M. Melde, and consists simply in attaching to the ventral segment of a vibrating body, such as a tuning-fork or a bell-glass, a silk or cotton thread, the other extremity being either fixed or passing over a pulley and supporting weights by which the thread may be stretched to any degree required. The vibrations of the larger mass are communicated to the thread which, by proper adjustment of its length and tension, vibrates in unison and divides itself into one or more ventral segments easily discernible by a spectator. If the length of the thread be kept invariable, a certain tension will give but one ventral segment; the fundamental note of the thread is then of same pitch as the note of the body to which it is attached. By reducing the tension to  $\frac{1}{4}$  of its previous amount, the number of ventral segments will be seen to be increased to two, indicating that the first harmonic of the thread is now in unison with the solid, and consequently that its fundamental is an octave lower than it was with the former tension; thus confirming the law that  $n$  varies as  $\sqrt{P}$ . In like manner, on further lowering the tension to  $\frac{1}{9}$ , three ventral segments will be formed, and so on.

The law that, *cet. par.*,  $n$  varies inversely as the thickness may be tested by forming a string of four lengths of the single thread used before, and consequently of double the thickness of the latter, when, for the same length and tension, the compound thread will exhibit double the number of ventral segments presented by the single thread.

The other laws admit of similar illustration.

## PART VII.

### Stiff Rods, Plates, &c.

67. If, instead of a string or thin wire, we make use of a rod, fixed at one end, and sufficiently stiff to resist flexure, we may cause it to vibrate transversely when fixed at one end only. In this case the number of vibrations corresponding to the fundamental note varies as the thickness directly, and as the square of the length inversely. The annexed figures represent the modes of vibration corresponding to the fundamental and the first two overtones, the rod passing to and fro between the positions AGKC and AHLD. In all cases A

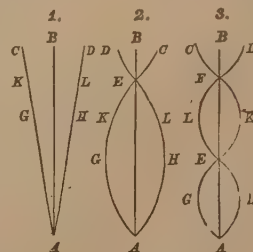


Fig. 20.



being fixed is necessarily a node, and B being free is the middle of a ventral segment. We have thus a succession of cases in which the rod contains  $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$ , &c. ventral segments. The numbers of vibrations per second are as the squares of these, or, as 1 : 9 : 25 : &c. The reason of this is, that (taking the case of fig. 20, 3) the part FB, which may be regarded as an independent rod fixed at the end F, is evidently  $\frac{1}{2}$  of the length of AB, and consequently, since  $n \propto \frac{1}{l}$ , has a proper note of  $5^2$  or 25 times the rapidity of vibration in fig. 20, 1.

By attaching, with a little bees' wax, stiff hog's bristles to one prong of a tuning-fork, or to the edge of a bell-glass, or even a common jar, and clipping them on trial to suitable lengths, we shall find that, on drawing a note in the usual way from the tuning-fork or glass, the bristles will divide into one or more separately vibrating segments, as in the above figs.

68. The tuning-fork itself may be regarded as belonging to the class of stiff rods. When emitting its fundamental note, it vibrates, as in fig. 21, with nodes at *b* and *d* and extreme positions *abde* and *fegdh*.

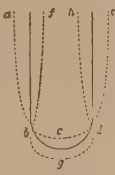


Fig. 21.

69. The transversal vibrations of thin square, circular, and other plates of metal or glass, are interesting, because, if these are kept in a horizontal position, light dry sand or powder sifted over the upper surface, will be thrown off the ventral segments to the nodal lines, which will thus be rendered manifest to the eye, forming what are termed *Chladni's figures*. As in the case of a musical string, so here we find that the pitch of the note is higher for a given plate the greater the number of ventral segments into which it is divided; but the converse of this does not hold good, two different notes being obtainable with the same number of such segments, the position of the nodal lines being, however, different.

70. The upper line of annexed figures shows how the sand arranges itself in three cases, when the plates are square. The lower line gives the same in a sort of

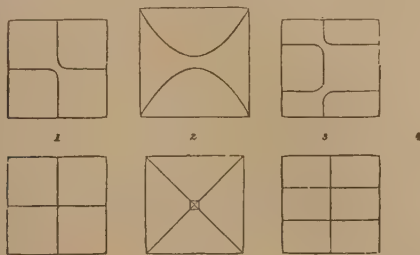


Fig. 22.

idealised form, and as usually to be found in acoustical works. Fig. 22, 1 corresponds to the lowest possible note of the particular plate used; Fig. 22, 2 to the *fifth* higher; Fig. 22, 3 to the *tenth* or octave of the *third*, the numbers of vibration in the same time being as 2 to 3 to 5.

If the plate be small, it is sufficient, in order to bring out the simpler sand-figures, to hold the plate firmly between two fingers of the same hand placed at any point where at least two nodal lines meet, for instance the centre in (1) and (2), and to draw a violin bow downwards across the edge near the middle of a ventral segment. But with larger plates, which alone will furnish the more complicated figures, a clamp-screw must be used for fixing the plate, and,

at the same time, one or more other nodal points ought to be touched with the fingers while the bow is being applied. In this way, any of the possible configurations may be easily produced.

71. By similar methods, a circular plate may be made to exhibit nodal lines dividing the surface by diametral lines into four or a greater, but always *even*, number of sectors, an odd number being incompatible with the general law of stationary waves that the parts of a body adjoining a nodal line on either side must always vibrate oppositely to each other.

Another class of figures consists of circular nodal lines along with diametral (fig. 23).



Fig. 23.

Circular nodal lines unaccompanied by intersecting lines cannot be produced in the manner described; but may be got either by drilling a small hole through the centre, and drawing a horse-hair along its edge to bring out the note, or by attaching a long thin elastic rod to the centre of the plate, at right angles to it, holding the rod by the middle and rubbing it lengthwise with a bit of cloth powdered with resin, till the rod gives a distinct note; the vibrations are communicated to the plate, which consequently vibrates transversely, and causes the sand to heap itself into one or more concentric rings.

72. The theory of the vibrations of plates has not yet been put on a quite satisfactory basis. The following law may, however, be regarded as confirmed by experiment, viz., that when two different plates of the same substance present the same nodal configuration, the numbers of vibrations are to each other directly as the thicknesses, and inversely as the superficial areas.

73. Paper, parchment, or any other thin membrane stretched over a square, circular, &c., frame, when in the vicinity of a sufficiently powerful vibrating body, will, through the medium of the air, be itself made to vibrate in unison, and, by using sand, as in previous instances, the nodal lines will be depicted to the eye, and seen to vary in form, number, and position with the tension of the plate and the pitch of the originating sound. The membrana tympani or drum of the ear has, in like manner and on the same principles, the property of repeating the vibrations of the external air which it communicates to the internal parts of the ear.

74. Rods vibrating longitudinally are, as we have already remarked, subject to the laws of stationary waves. If, for instance, a wooden rod fixed at one end, be rubbed near the top between the finger and thumb previously coated with powdered resin, it will yield a fundamental note when it so vibrates as to have only *one* node (at the fixed extremity) and half a ventral segment reaching from that extremity to the other, that is, when the length *l* of the rod is  $\frac{1}{4} \lambda$ , or  $\lambda = 4l$ , and therefore  $n = \frac{V}{4l}$ . But it may also give overtones corresponding to 2, 3, &c. nodes, the free end being always the middle of a ventral segment, and for which therefore the lengths of waves are  $\frac{4l}{3}, \frac{4l}{5}$ , &c. (as will be easily seen by referring to figs. in § 67, which may equally represent transversal and longitudinal displacements). Hence, the fundamental and harmonics of a rod such as we are now considering, have vibrations whose rates are as the successive odd numbers.

A series of like rods, each fixed at one end into a block of wood, and of lengths bearing to each other, the ratios 1 :  $\frac{3}{2}$  : &c. (as in § 61), will give the common scale when rubbed in the manner already mentioned. This follows from the fundamental having  $n = \frac{V}{4l}$ , and therefore  $n \propto \frac{1}{l}$ .

Glass rods or tubes may also be made to vibrate longitudinally by means of a moist piece of cloth; but it is advisable to clamp them firmly at the centre, when each half will vibrate according to the same laws as the wooden rods above. The existence of a motion of the particles of glass to and fro in the direction of its length may be well exhibited, by allowing a small ball of stone or metal suspended by a string to rest against one extremity of the rod, when, as soon as the latter is made to sing by friction, the ball will be thrown off with considerable violence.

## PART VIII.

### Theory of Pipes.

Air is the essential source of sound in pipes.

Principles of Bernoulli's theory.

75. The longitudinal vibrations of air enclosed in pipes are of greater practical importance than those of other bodies, because made available to a very great extent for musical purposes. In the flute, horn, trumpet, and other wind instruments, it is the contained air that forms the essential medium for the production of sound, the wood or metal enclosing it having no other effect but to modify the *timbre* or acoustic colour of the note.

76. In dealing with the theory of pipes, we must treat the air precisely in the same manner as we have dealt with elastic rods vibrating lengthwise, a pipe stopped at both ends being regarded as equivalent to a rod fixed at both ends, a pipe open at both ends to a rod free at both ends, and a pipe stopped at one end and open at the other to a rod fixed at one end and free at the other. When therefore the air within the pipe is anywhere displaced along the length of the pipe, two waves travel thence in opposite directions, and being reflected at the extremities of the pipe, there results a stationary wave with one or more fixed nodal sections, on one side of which the air is at any moment being displaced in one direction, while on the other side it is displaced in the opposite. Hence, when the air on both sides of the node is moving in towards it, there is condensation going on at the node, followed by rarefaction on the reversal of the motion of the air. The full lines in annexed figs. are curves of displacements, the dotted lines curves of velocity and density (*vid.* § 10 and 14).

As a stopped end prevents any motion of the air, a nodal section is always found there. And as, at the open end, we may conceive the internal air to be maintained at the same density as the external air, we may assume that such end coincides with the middle of a ventral segment.

From these assumptions, which form the basis of Bernoulli's Theory of Pipes, we infer:

77. That in a pipe stopped at both ends, as in a rod fixed at both ends, the fundamental note (fig. 25, 1), corresponds to  $\lambda = 2l$ , and therefore to  $n = \frac{V}{2l}$ ,  $V$  denoting the velocity of sound in air, and the overtones to numbers of vibrations  $= 2n, 3n$ , and so on. Fig. 25, 2, represents the octave.

78. That in a pipe open at both ends the same holds good as in the previous case. For (fig. 26, 1)  $AC = \frac{1}{2} \lambda$   $\therefore \lambda = 4 AC = 2l$ , and in fig. 26, 2,  $AD = \frac{1}{2} \lambda$ , and also  $= \frac{1}{2} l$ .  $\therefore \lambda = l$ , or  $\frac{1}{2}$  its value for the fundamental and similarly for the other harmonics.

79. That in a pipe open at one end and stopped at

the other (or, as it is usually termed, a *stopped pipe*, case § 77, being purely imaginary), the fundamental note has  $n = \frac{V}{4l}$  and the overtones correspond to  $3n, 5n, \dots$

For, in fig. 27, 1,  $AB$  or  $l = \frac{1}{2} \lambda$ , and in fig. 27, 2,  $CB$  or  $\frac{1}{2} \lambda$  is evidently  $= \frac{1}{2} AB$  or  $\frac{1}{2} l$ , whence  $\lambda = \frac{1}{2} l$ , which being  $\frac{1}{2}$  of value of  $\lambda$  in previous case, shows that the number of vibrations is three times greater. Similarly for the other overtones.

80. It follows from the above, that a given pipe Harmonics in pipes-

(whether open or stopped) may be made to emit, in addition to or in combination with its fundamental, a series of overtones, which, in an open pipe, follow the natural numbers, and hence are the octave, twelfth, &c., but, in a *stopped pipe*, follow the *odd* numbers, so as to want the octave and other notes represented by the even numbers. The succession of overtones may be practically obtained by properly regulating the force of the blast of air by which the air-column is put into vibration.

81. If the fundamental notes of two pipes of equal lengths, but of which one is open, the other stopped, be compared together, they will be found to differ in pitch by an octave, the stopped being the lower. This fact is in keeping with the theory, for the numbers of vibrations of equal lengths.

being respectively  $\frac{V}{2l}$  and  $\frac{V}{4l}$ , are in the ratio of 2 to 1.

82. By altering the length of the same pipe, we can vary the pitch of the fundamental at pleasure, since  $n$  varies inversely as  $l$ . This is effected in the flute and some other wind instruments by means of openings along part of the pipe, which, being closed or opened by means of keys and of the fingers, increase or diminish the length of the vibrating air-column. In this manner the successive notes of the scale are usually obtained within the range of an octave. The scale is further extended by bringing into play the higher harmonics.

83. Since in an open pipe  $n = \frac{V}{2l}$ , and therefore  $l = \frac{V}{2n}$ , Length of pipe. if for  $V$  we put 1090 ft., and for  $n$  264, which is the number of vibrations per second usually assigned to the note C, we get  $l = 2$  ft. very nearly. This, accordingly, is the length of the so-called C open pipe. The C stopped pipe must, by what has been stated above, be 4 feet in length.

84. Conversely it is obvious that the velocity  $V$  of sound in air, and generally in any gas, may be deduced from the equation  $V = 2nl$ , and that if two pipes of equal length contain respectively air and any other gas, the velocities in the two media being to each other directly as the number of vibrations of the notes they respectively emit, we may, from the well-ascertained value of the velocity in air, determine in this way the velocities in other gases, and thence the values of their coefficients  $\gamma$  (*vid.* § 21).

85. While the inferences drawn by means of Bernoulli's theory agree, to a certain extent, with actual observation, Bernoulli's theory. there are discrepancies between the two which point to the existence of some flaw in one or both of the hypotheses on which the theory rests. In truth, the conditions assumed by Bernoulli are such as do not fully occur in

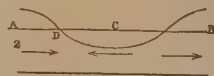
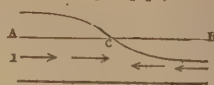


Fig. 26

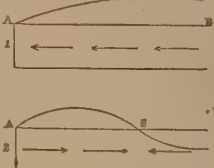


Fig. 27

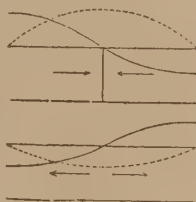


Fig. 24.

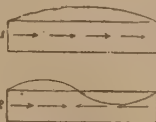


Fig. 25.

Open pipe.

pipe stopped at one end only.

Velocity in any gas derived from pipes.

Defects of Bernoulli's theory.



practice. The stopped extremity of a pipe is always to some extent of a yielding nature, and does not therefore exactly coincide with a nodal surface; nor can the internal air immediately adjoining the open end be perfectly free from variation of density during the vibrations of the whole mass, particularly so at the *embouchure*, where the blast is introduced by which the tone is originated. It would appear from recent experiments that the pitch of a pipe is somewhat lower than the above theory would indicate.

**Reed pipes.** 86. The reed-pipe differs in many respects from the simple pipe which we have been considering. A small elastic strip of metal, fixed at one extremity (the *reed*), lies over a slit of the same shape, and is set in transverse vibration by a current of air acting underneath. If, as is the case in the accordion and harmonium, the reed is unprovided with a pipe, the pitch of its note is regulated altogether by the dimensions of the reed, in conformity with the law of transversely vibrating plates; although, it is to be remarked, the note is really due to the vibrations of the air which alternately escapes through the slit of the reed, and is prevented doing so exactly as often as the reed executes a movement to and fro. The proper note of the reed itself is very poor and faint.

**Influence of pipe on reed.** 87. In the reed-pipe there is added above the reed a pipe the air in which partakes of the vibratory motion, and improves the quality of the sound. The pitch is, however, not affected by this pipe, unless it exceed a certain length  $l$ , when the pitch begins to fall, and continues to do so as  $l$  is increased, till, when the length of pipe is  $2l$ , the note is again restored to its original pitch, &c.

**Weber's theory of reed pipes** 88. M. Weber, to whom we are indebted for these and other curious facts respecting reed pipes, has explained them thus:—If the reed be exactly at that part of the vibrating air-column where the air-displacements are at their maximum, and where consequently the air suffers no variation of density during the vibratory motion of the column, the oscillations of the reed are not at all affected by the air-vibrations, and consequently the pitch of the reed-pipe is the same as that of the reed itself. But if the reed be situated at any other part of the air-column, and especially at a nodal section, where the air is undergoing alternate condensation and rarefaction, then, when the air-blast from the wind chest pushes in the reed, the air in the pipe is in the act of rarefaction, and consequently tends to accelerate the reed inwards, whereas the elasticity of the reed tends in an opposite direction. When, again, the reed is passing to the other extreme of its vibration, the air in the pipe is in the act of condensation, and tends to accelerate the reed outwards or in the opposite direction to the elasticity of the reed. Hence the reed is affected just as if its elasticity, and therefore the rapidity of its vibrations, were diminished, and thus the pitch is lowered.

## PART IX.

### *Singing Flames.*

**Gas harmonicon.** 89. The *chemical* or *gas harmonicon*, which consists of a small flame of hydrogen or of coal gas, burning at the lower part of the interior of a glass tube, and giving out a very distinct note, exhibits considerable analogy with the reed-pipe. For, as Sondhaus seems to have established, the primary cause of the note lies in the oscillations of the gas within the burner and the feeding-pipe, which therefore play exactly the same part as does the reed portion of the reed-pipe. The air in the glass tube being heated by the flame ascends, and the pressure above the flame being thence diminished, the flame is forced upwards by the gas beneath, until an influx of atmospheric air at the top of the tube forces the flame back. Thus a periodic agitation

of the flame ensues, accompanied by a corresponding disturbance of the air-column in the glass tube. The size of the flame and its position within the tube must be so regulated as to bring out the best possible note, which will then be found to be the same as the air in the tube would itself emit, according to the laws of pipes, allowance being made for the high temperature of the air. A series of tubes may thus be arranged of suitable lengths to give the common scale. It sometimes happens, particularly with short tubes, that the note will not come out spontaneously, all that is required, then, is either by blowing gently at the top of the tube, or by singing in unison with the expected note, to give to the air the requisite initial movement.

The flame, which burns steadily with a yellowish light before the tube sounds, will, as soon as the note is heard, be seen to flicker up and down, changing rapidly from yellow to blue and blue to yellow, its intensity also changing periodically. These fluctuations are best seen by viewing the image of the flame reflected by a small plane mirror, held in the hand and moved to and fro. Before the note is heard, the image of the then quiescent flame, being impressed on different points of the retina, appears as a continuous luminous strip; but, when the harmonicon speaks, the various images become quite detached from one another, showing that the portion of the retina over which the reflected light passes is sensibly affected only at certain points of it, which evidently correspond to the instants of time at which the flame, in its periodical fluctuations, is at its brightest.

90. Naked flames, that is, flames unaccompanied by tubes, Naked may also give out musical notes, and many singular in flames. instances are mentioned by Tyndall and others of their sensitiveness to external sounds.

91. Koenig of Paris has constructed an apparatus in Flame tended to indicate the modes of vibration of the different manometer parts of vibrating bodies, such as columns of air, &c., by means of flames, and to which he has given the name of the *Flame Manometer*. We will here describe its application to the case of organ-pipes. An open pipe has three apertures along one side, one at the middle,  $o$  (fig. 28), *i.e.*, at a node of the fundamental tone, and the two others,  $a, b$ , half way between  $o$  and the extremities of the pipe, and coinciding therefore with the nodes of the first overtone or octave. These openings are closed by thin flexible membranes forming the ends of small boxes or *capsules*, the spaces within which communicate by caoutchouc tubes with a coal-gas reservoir, and also by separate tubes with small gas burners arranged on a vertical stand. The gas being introduced, and the three flames kindled and adjusted to equal heights of about  $\frac{1}{2}$  of an inch; if the pipe be made now to utter its first overtone, the flame connected with  $o$  will remain stationary and of the same brightness as before, but those communicating with  $a$  and  $b$  will become longer and thinner, and assume a bluish and faint luminosity. But, if the fundamental be brought out of the pipe, then it is  $o$ 's flame that is violently affected, while those of  $a$  and  $b$  are scarcely affected at all. If the flames be originally made less in height (say  $\frac{1}{3}$  inch), those of  $a$  and  $b$  in the former case, and of  $o$  in the latter, will be extinguished. These results are due to the condensations and rarefactions of the air in the pipe which are at their maximum at a node, causing the membrane placed there to vibrate outwards and inwards, and hence to force more or less of the gas into the burner.

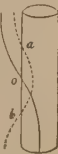


Fig. 28.

In order to compare together the notes of different pipes, four plane reflecting surfaces are connected together in the form of a cube, which is mounted on a vertical axis about which it is capable of being turned round. Each pipe is

furnished with one opening, a membrane, &c. (as above), at its middle. As pointed out (§ 87), if any of the pipes be made to sound, the reflector being at the same time put in motion, a series of separate images will be seen. On sounding another pipe, whose fundamental is an octave higher, we shall have a second line of images separated from each other by half the interval of those in the former series. This is best observed when the two flames are placed in the same vertical line. If the note of the second pipe is a fifth higher than the first, and consequently its vibrations to those of the first as 3 to 2, then the same space which contains two images of the lower note will contain three of the higher, and so on, for other combinations. When more complicated ratios are to be tested, it is preferable to connect both capsules with the same burner, either with or without the reflector.

## PART X.

*Communication of Vibrations.*

Communication between gases, solids, and liquids.

92. The communication of sonorous vibrations from one body to another plays so essential a part in acoustics that a few words must here be given to the subject. It appears to be well established that while the vibrations of a solid are in general most readily communicated to other solids in contact with it, they are not so to liquids, and still less so to air and other aeriform fluids. Thus, a tuning-fork is inaudible at any moderate distance unless applied to a table, by whose extended surface the air can be more intensely affected. So likewise a musical string sounds very poorly unless connected with a resonant cavity or wooden chest, to the wood of which it first imparts its vibratory motion, which then produces stationary waves in the continued air.

Kundt's experiments.

93. A few years ago M. Kundt made known a method founded on the communicability of vibration, by which the velocities of sound in different media may be compared together with great facility. Take a glass tube 3 feet or upwards in length, drop into it a small quantity of the fine powder of the club-moss or lycopodium, and turn the tube round so as to spread the powder over the internal surface of the tube. Stop both ends of the tube with corks, clamp it at its centre, and rub one of its halves lengthwise with a moist cloth, so as to cause the glass to sound a note. It will then be found that, the air within the tube taking up the motion, and a stationary wave being formed in it, the powder is driven off from the ventral segments and forms little heaps at the nodes. The dust-heaps are, by the laws of stationary waves, separated therefore from each other by intervals each equal to half the length of an air-wave, or  $\frac{\lambda}{2}$ . If, then, the number of heaps =  $m$ , and the length of the tube =  $l$ ;  $\lambda = \frac{2l}{m}$ .

But, by the laws of longitudinal vibrations of rods, the length  $\lambda'$  of the glass-wave =  $4\left(\frac{l}{2}\right) = 2l$ . Hence  $\frac{\lambda'}{\lambda} = m$ , that is, the number of dust-heaps is equal to the ratio of the lengths of a wave of sound in glass and in air, and consequently to the ratio of the velocities of sound in those media. (For the vibrations being in unison, their number in a given time must be the same for the glass and the air, i.e.,  $\frac{V}{\lambda'} = \frac{V'}{\lambda}$ ;  $V, V'$  being the velocities).

Kundt found 16 to be the number of heaps; prior experiments of a different kind had, as we have before mentioned, given this as the number of times that the velocity of sound in glass exceeds its velocity in air.

Instead of producing the air-vibrations by friction of the tube containing the air, it is preferable to make use of a smaller tube or rod, furnished with a cork at one end, which

fits like a piston into the tube, and projecting at its outer end through an opening in the cork which closes the air-tube. The rod thus inserted is the one which is rubbed longitudinally and communicates its vibrations to the air in the enclosing tube. By means of an apparatus of this kind, Kundt determined the ratio to the velocity of sound in air of its velocity in various solids, and also (replacing the air in the tube by different gases) of its velocity in these gases.

## PART XI.

*Interference of Sound.*

94. When two or more sonorous waves travel through the same medium, each particle of the air being simultaneously affected by the disturbances due to the different waves, moves in a different manner than it would if only acted on by each wave singly. The waves are said mutually to interfere. We shall exemplify this subject by considering the case of two waves travelling in the same direction through the air. We shall then obviously be led to the following results:—

95. If the two waves are of equal length  $\lambda$ , and are in the same phase (that is, each producing at any given moment the same state of motion in the air-particles), their combined effect is equivalent to that of a wave of the same length  $\lambda$ , but by which the excursions of the particles are increased, being the sum of those due to the two component waves respectively.

If the two interfering waves, being still of same length  $\lambda$ , be in opposite phases, or so that one is in advance of the other by  $\frac{\lambda}{2}$ , and consequently one produces in the air the opposite state of motion to the other, then the resultant wave is one of the same length  $\lambda$ , but by which the excursions of the particles are decreased, being the difference between those due to the component waves. If the amplitudes of vibration which thus mutually interfere are moreover equal, the effect is the total mutual destruction of the vibratory motion.

Thus we learn that two musical notes, of the same pitch, conveyed to the ear through the air, will produce the effect of a single note of the same pitch, but of increased loudness, if they are in the same phase, but affect the ear very slightly, if at all, when in opposite phases. If the difference of phase be varied gradually from zero to  $\frac{1}{2}\lambda$ , the resulting sound will gradually decrease from a maximum to a minimum.

96. Among the many experimental confirmations which may be adduced of these proportions, we will mention the following:—

Take a circular plate, such as is available for the production of Chladni's figures (§ 71), and cut out of a sheet of pasteboard a piece of the shape ABOCD (fig. 30), consisting of two circular quadrants of the same diameter as the plate. Let, now, the plate be made in the usual manner to vibrate so as to exhibit two nodal lines coinciding with two rectangular diameters. If the ear be placed right above the centre of the plate, the sound will be scarcely audible. But, if the pasteboard be interposed so as to intercept the vibrating segments AOB, DOC, the note becomes much more distinct. The reason

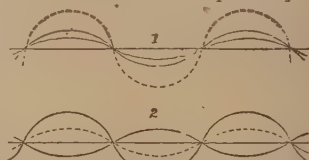


Fig. 29.



Fig. 30.

Experimental illustrations.

Vibrating plate.



of this is, that the segments of the plate AOD, BOC always vibrate in the same direction, but oppositely to the segments AOB, DOC. Hence, when the pasteboard is in its place, there are two waves of same phase starting from the two former segments, and reaching the ear after equal distances of transmission through the air, are again in the same phase, and produce on the ear a conjunct impression. But when the pasteboard is removed, then there is at the ear opposition of phase between the first and the second pair of waves, and consequently a minimum of sound.

97. A tubular piece of wood shaped as in fig. 31, and having a piece of thin membrane stretched over the opening at the top C, some dry sand being strewn over the membrane, is so placed over a circular or rectangular vibrating plate, that the ends A, B lie over the segments of the plate, such as AOD, COB in the previous fig., which are in the same state of motion. The sand at C will be set in violent movement. But if the same ends A, B, be placed over oppositely vibrating segments (such as AOD, COD), the sand will be scarcely, if at all, affected.



Fig. 31.

98. If a tuning-fork in vibration be turned round before the ear, four positions will be found in which it will be inaudible, owing to the mutual interference of the oppositely vibrating prongs of the fork. On interposing the hand between the ear and either prong of the fork when in one of those positions, the sound becomes audible, because then one of the two interfering waves is cut off from the ear. This experiment may be varied by holding the fork over a glass jar into which water is poured to such a depth that the air-column within reinforces the note of the fork when suitably placed and then turning the fork round.

99. Helmholtz's double syren (§ 51) is well calculated for the investigation of the laws of interference of sound. For this purpose a simple mechanism is found in the instrument, by means of which the fixed upper plate can be turned round and placed in any position relatively to the lower one. If, now, the apparatus be so set that the notes from the upper and lower chest are in unison, the upper fixed plate may be placed in four positions, such as to cause the air-current to be cut off in the one chest at the exact instant when it is freely passing through the other, and *vice versa*. The two waves, therefore, being in opposite phases, neutralise one another, and the result is a faint sound. On turning round the upper chest into any intermediate position, the intensity of the sound will increase up to a maximum, which occurs when the air in both chests is being admitted and cut off contemporaneously.

100. If two pipes, in exact unison, and furnished with flame manometers, are in communication with the same wind-chest, and the two flames be placed in the same vertical line, on introducing the current from the bellows, we shall find that the two lines of reflected images will be so related that each image in one lies between two-images in the other. This shows that the air-vibrations in one pipe are always in an opposite phase to the other, or that condensation is taking place in the one when rarefaction occurs in the other. This arises from the current from the bellows passing alternately into the one and the other pipe. There will also be a remarkable collapse of the sound when both pipes communicate with the wind-chest compared with that produced from one pipe alone.

101. If the two interfering waves are such as produce vibrations whose numbers per second are  $n, n'$  respectively, these being to each other in the ratio of two integers  $m, m'$  when expressed in its lowest terms, then the lengths of the waves  $\lambda, \lambda'$  being inversely as  $n$  to  $n'$ , will be to each other as  $m' : m$ , and consequently  $m\lambda = m'\lambda'$ . Particles therefore of the air separated by this distance from each

other will be in the same phase, that is, the length of the resultant wave will be  $m\lambda$  or  $m'\lambda'$ , and if  $N$  denote the corresponding number of vibrations  $N = \frac{n}{m}$  or  $\frac{n'}{m'}$ .

Thus, for the fundamental and its octave  $\frac{n}{n'} = \frac{1}{2}$ , and therefore  $N = n$  or  $\frac{n}{2}$ ; that is, the note of interference is of the same pitch as the fundamental.

For the fundamental and its major third,  $\frac{n}{n'} = \frac{4}{5}$ . Hence  $N = \frac{n}{4}$  or  $\frac{n'}{5}$ , that is, the resulting sound is two octaves lower than the fundamental.

For the fundamental and its major sixth,  $\frac{n}{n'} = \frac{3}{5}$ ;  $N$  therefore =  $\frac{n}{3}$  or  $\frac{n'}{5}$ , and the resulting sound is a twelfth below the lower of the two interfering notes.

If  $m$  and  $m'$  differ by 1, then  $N = n - n'$ ; for  $m - m' = 1 = \frac{n}{N} - \frac{n'}{N}$ . Hence, if the ratio of the vibrations of two interfering sounds is expressible in its lowest terms by numbers whose difference is unity, the resulting note has a number of vibrations simply equal to the difference of those of the interfering notes.

The results stated in this section may be tested on a harmonium. Thus, if the notes B, C, at the extreme right of the instrument be struck together, there will be heard an interference note four octaves lower in pitch than the above C, because the interval in question being a semitone, is  $\frac{1}{2}$ , and, consequently, by last case, the interference note is lower than the C by interval  $\frac{1}{8}$ .

Other notes may be heard resulting from the mutual interference of the overtones.

102. When two notes are not quite in tune, the resulting sound is found to alternate between a maximum and minimum of loudness recurring periodically. To these periodical alternations has been given the name of *Beats*. Their origin is easily explicable. Suppose the two notes to correspond to 200 and 203 vibrations per second; at some instant of time, the air-particles, through which the waves are passing, will be similarly displaced by both, and consequently the joint effect will be a sound of some intensity. But, after this, the first or less rapidly vibrating note will fall behind the other, and cause a diminution in the joint displacements of the particles, till, after the lapse of  $\frac{1}{6}$  of a second, it will have fallen behind the other by  $\frac{1}{2}$  a vibration. At this moment, therefore, opposite displacements will be produced of the air-particles by the two notes, and the sound due to them will be at a minimum. This will be followed by an increase of intensity until the lapse of another sixth of a second, when the less rapidly vibrating note will have lost another half-vibration relatively to the other, or one vibration reckoning from the original period of time, and the two component vibrations will again conspire and reproduce a maximum effect. Thus, an interval of  $\frac{1}{3}$  of a second elapses between two successive maxima or beats, and there are produced three beats per second. By similar reasoning it may be shown that the number of beats per second is always equal to the difference between the numbers of vibrations in the same time corresponding to the two interfering notes. The more, therefore, these are out of tune, the more rapidly will the beats follow each other.

Beats are also heard, though less distinctly, when other concords such as thirds, fifths, &c., are not perfectly in tune; thus, 200 vibrations and 303 vibrations per second, which form, in combination, an imperfect fifth, produce beats occurring at the rate of three per second.

Fundamental and its octave.

Fundamental and major third.

Fundamental and major sixth.

Case of  $m - m' = 1$ .

Hopkins's experiment.

Tuning fork.

Double syren.

Flame manometer.

Interference of two sets of vibrations for which

$$\frac{n}{m} = \frac{n'}{m'}$$

### Examples of beats.

103. The phenomena of beats may be easily observed with two organ-pipes put slightly out of tune by placing the hand near the open end of one of them, with two musical strings on a resonant chest, or with two tuning-forks of same pitch held over a resonant cavity (such as glass jar, *vid.* § 97), one of the forks being put out of tune by loading one prong with a small lump of bees'-wax. In the last instance, if the forks are fixed on one solid piece of wood which can be grasped with the hand, the beats will be actually felt by the hand. If one prong of each fork be furnished with a small plain mirror, and a beam of light from a luminous point be reflected successively by the two mirrors, so as to form an image on a distant screen, when one fork alone is put in vibration, the image will move on the screen and be seen as a line of a certain length. If both forks are in vibration, and are perfectly in tune, this line may either be increased or diminished permanently in length, according to the difference of phase between the two sets of vibrations. But if the forks be not quite in tune, then the length of the image will be found to fluctuate between a maximum and a minimum, thus making the beats sensible to the eye. The vibrograph (§ 52, 53) is also well suited for the same purpose, and so in an especial manner is Helmholtz's double syren (§ 51), in which, by continually turning round the upper box, a note is produced by it more or less out of tune with the note formed by the lower chest, according as the handle is moved more or less rapidly, and most audible beats ensue. The gas harmonica and the flame manometer also afford excellent illustrations of the laws of beats.

The number of vibrations of a note found by beats.

104. Advantage has been taken of these laws for the purpose of determining the absolute number of vibrations per second corresponding to any given note in music, whence may be derived the number for all the other notes (§ 45). The human ear may be regarded as most correctly appreciating two notes differing by an octave. Two tuning-forks then are taken, giving respectively the note  $A$  and its lower octave, and a number of other forks are prepared intermediate in pitch to these, say 54, and by means of bees'-wax these are so tuned, that the first gives four beats with the  $A$  fork, the second four beats with the fourth, and so on up to the last, which also gives four beats with the  $A_1$  fork. Now, if  $n$  = the unknown number of vibrations for the note  $A$ ,  $n-4$ ;  $n-8$  . . .  $n-55 \times 4$ , will be the numbers for all the successive forks down to the  $A_1$  fork, which being an octave below  $A_1$ , we have  $\frac{n-55 \times 4}{n} = \frac{1}{2}$  and consequently  $n = 440$ .

### Tuning by beats.

105. Beats also afford an excellent practical guide in the tuning of instruments, but more so for the higher notes of the register, inasmuch as the same number of beats, that is, the same difference between the numbers of vibrations, for two notes of high pitch, indicates greater deviation from perfect unison, than it does for two notes of low pitch. Thus, two low notes of 32 and 30 vibrations respectively, whose interval is therefore  $\frac{32}{30}$  or  $\frac{16}{15}$  i.e., a semi-

tone, give two beats per second, while the same number of beats are given by notes of  $32 \times 16$  (four octaves higher than the first of the preceding) or 512 and 514 vibrations, which are only slightly out of tune.

Irritating  
effect of  
rapid beats

108. As the interval between two notes, and consequently the number of beats increases, the effect on the ear becomes more and more unpleasant, and degenerates at last into an irritating rattle. With the middle notes of the musical register, this result occurs when the number of beats comes up to 20 or 30 per second, the musical interval between the two interfering notes being then between half and a whole tone. Helmholtz attributes the disagreeable impression of beats on the ear, to the same physiological cause

to which is due the painful effect on the eye of a faint flickering light, as, for instance, the light streaming through a wooden paling with intervening openings when the individual affected is passing alongside. In this case, the retina, which, when continuously receiving the same amount of light, thereby loses its sensitiveness in a great degree, is unable to do so.

It is, however, remarked by the above-mentioned author that the same number of beats, which has so irritating an effect when due to two notes in the middle of the register, is not attended by the same result when due to notes of much lower pitch. Thus, the notes C, D forming a tone give together 33 beats per second, while a note two octaves lower than C also gives 33 beats with its fifth; yet the former combination forms a discord, the latter a most pleasing concord.

107. When the number of beats reaches to 132 or upwards per second, the result is a continuous and not unpleasant impression on the ear, and it was formerly held that the effect was always equivalent to that of a note having that number of vibrations. Helmholtz has shown that this opinion is inaccurate, except when the interfering tones are very loud, and consequently accompanied by very considerable displacements of the particles of the vibrating medium. These resultant tones being, as to their vibration-number, equal to the difference between the numbers corresponding to the two primaries, are termed *difference-tones*, and may be best observed with the double syren. The same author was led also, on theoretical grounds, to surmise the formation of *summation-tones* by the interference of two loud primaries, the number of resultant vibrations being then equal to the sum of the numbers for the two components, and appealed for experimental proof to his syren. But, at the last meeting of the British Association (1872), Koenig, the celebrated Parisian acoustician, maintained that the notes of the syren, thus held to be summation-tones, were in reality the *difference-tones* of the harmonics.

108. By reference to the laws of the interference of vibrations, Helmholtz has been enabled to offer a highly satisfactory explanation of the cause whence arises difference of quality or timbre or acoustic colour between different sounds. He has shown conclusively that there are but few sounds which are of a perfectly simple character, that is, in which the fundamental is not accompanied by one or more overtones. Now, when a note is simple, there can be no jarring on the ear, because there is no room for interference of sound. Hence, the softness of the tuning-fork when its fundamental is reinforced by a resonant cavity, and also of the flute. The same character of softness belongs also to those instruments in which the powerful harmonics are limited to the vibration ratios 2, 3... 6 (§ 57, 80); because the mutual interference of the fundamental and their harmonics give rise to concords only. The piano, the open organ pipe, the violin, and the softer tones of the human voice, are of this class. But if the *odd* harmonics alone are present, as in the narrow stopped organ pipe, and in the clarinet, then the sound is poor, and even nasal; and if the higher harmonics beyond the sixth or seventh are very marked, the result is very harsh (as in reed-pipes).

109. The *human voice* (for a description of the organ in *Voice*, which it originates, we refer to Art. *Physiology—Voice and Speech*) is regarded by the best authorities as being analogous to a reed-pipe, the vocal chords forming the reed, and the cavity of the mouth the pipe, and, like the reed, is rich in harmonics, as many as sixteen having been detected in a *bass* voice. But their number and relative intensities differ much in different individuals, or even in the same person at different times; and it is on this variety that, agreeably to Helm-



Holtz's theory of timbre, the peculiarities depend by which any one voice may be unmistakably distinguished from every other. Voices in which overtones abound are sharp, and even rough; those in which they are few or faint, are soft and sweet. In every voice, however, the number and relative intensity of the overtones depend on the form assumed by the cavity of the mouth, which acts relatively to the vocal chords precisely as a resonator does to a tuning-fork, or a pipe to a reed. This may be easily tested by holding a tuning-fork before the open mouth, when, by giving to the cavity a suitable form, the fundamental or some overtone of the fork may be heard distinctly reverberated from the interior of the mouth. Each vowel sound, as Helmholtz has shown, is simply the result of the reinforcements by the air in the cavity of the mouth, and its prolongation towards the larynx, of one or in some cases two overtones of determinate pitch, contained in the sound which proceeds from the vocal chords. Koenig assigns the following notes as characteristic of the simpler vowel sounds (adopting the foreign pronunciation):—To U, the note B $\flat$  below the line in the G clef, corresponding to 225 vibrations per second; to O, the next higher octave. consequently of

double the number of vibrations, and thence ascending by octaves for A, E, and I, the last of which is therefore characterised by a note of 3600 vibrations per second.

The above theory of vowel sounds may be satisfactorily confirmed by means of tuning-forks, vibrating in front of resonant cavities, which can, by suitable combination, be made to utter any vowel sound.

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Vowel sounds.



ALPHABETICAL INDEX.

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**ACQUI**, a town of Northern Italy, in the province of Alessandria, 18 miles S.S.W. of the city of that name, on the left bank of the Bormida. It is a place of great antiquity; and its hot sulphur baths, which are still much frequented, were known to the Romans, who gave the place the name of *Aqua Statiella*. There are still to be found numerous ancient inscriptions, and the remains of a Roman aqueduct. The town is the seat of a bishop, and has a fine cathedral, several convents, and a royal college. Good wine is produced in the vineyards of the district, and great attention is given to the rearing of silk-worms. There are also considerable silk manufactures. Population, 8600.

**ACRE**, a measure of surface, being the principal denomination of land-measure used in Great Britain. The word (akin to the Saxon *acer*, the German *acker*, and the Latin *ager*, a field) did not originally signify a determinate quantity of land, but any open ground. The English standard or imperial acre contains 4840 square yards, or 10 square chains, and is also divided into *roods*, of which it contains 4, the rood again being divided in 40 *perches*. The imperial acre has, by the Act 5 Geo. IV. c. 74, superseded the acres, of very different extent, that were in use in different parts of the country. The old Scottish acre was equal to 1.26118345 imperial acres. The Irish acre contains 7840 square yards. The acre is equivalent to .40467, i.e., about  $\frac{1}{2}$ ths, of the French *hectare* (now the basis of superficial measurement in Germany, Italy, and Spain, as well as in France),  $\frac{1}{7}$  of the Austrian *joch*,  $\frac{1}{37}$  of the Russian *desiatine*, and  $\frac{1}{62}$  ancient Roman *juga*. The *hectare* corresponds to 2 acres 1 rood 35.38 perches.

**ACRE, AKKA, or ST JEAN D'ACRE**, a town and seaport of Syria, and in ancient times a celebrated city. No town has experienced greater changes from political revolutions and the calamities of war. According to some this was the *Accho* of the Scriptures; and its great antiquity is proved by fragments of houses that have been found, consisting of that highly sun-burnt brick, with a mixture of cement and sand, which was only used in erections of the remotest ages. It was known among the ancients by the name of *Ace*, but it is only from the period when it was taken possession of by Ptolemy Soter, king of Egypt, and received from him the name of *Ptolemais*, that history gives any certain account of it. When the empire of the Romans began to extend over Asia, Ptolemais came into their possession: It is mentioned by Strabo as a city of great importance; and fine granite and marble pillars, monuments of its ancient grandeur, are still to be seen. During the Middle Ages Ptolemais passed into the hands of the Saracens. They were expelled from it in 1110 by the Crusaders, who made it their principal port; and retained it until 1187, when it was recovered by Saladin. In 1191 it was retaken by Richard I. of England and Philip of France, who purchased this conquest by the sacrifice of 100,000 troops. They gave the town to the knights of St John of Jerusalem, from whom it received the name of St Jean D'Acre. In their possession it remained for a century, though subject to continual assaults from the Saracens. It was at this time a large and extensive city, populous and wealthy, and contained numerous churches, convents, and hospitals, of which no traces now remain. Acre was finally lost to the Crusaders in 1291, when it was taken by the Saracens after a bloody siege, during which it suffered severely. From this time its prosperity rapidly declined. In 1517 it fell into the hands of the Turkish sultan, Selim I.; and in the beginning of the 18th century, with the exception of the residences of the French factors, a mosque, and a few poor cottages, it presented a vast scene of ruin. Towards the end of that century Acre was much strengthened and improved by the Turks, particularly by Djezzar Pacha, and again rose to some importance. It is memor-

able in modern history for the gaudantry with which it was defended in 1799 by the Turks, assisted by Sir Sydney Smith, against Bonaparte, who, after spending sixty-one days before it, was obliged to retreat. It continued to enjoy an increasing degree of prosperity till 1832. Though fettered by imposts and monopolies, it carried on a considerable foreign trade, and had resident consuls from most of the great states of Europe. On the revolt of Mehemet Ali, the pacha of Egypt, Acre was besieged by his son, Ibrahim Pacha, in the winter of 1831-32. The siege lasted five months and twenty-one days, and, before the city was taken, its public and private buildings were mostly destroyed. Its fortifications were subsequently repaired and improved by the Egyptians, in whose hands it remained until 3d Nov. 1840, when the town was reduced to ruins by a three hours' bombardment from the British fleet, acting as the allies of the sultan. The Turks were again put in possession of it in 1841.

Acre is situated on a low promontory, at the northern extremity of the Bay of Acre. The bay affords no shelter in bad weather; and the port is scarcely capable of containing a dozen boats. Vessels coming to this coast, therefore, generally frequent the anchorage of Caiffa, on the south side of the bay. Acre is 80 miles N.N.W. of Jerusalem, and 27 S. of Tyre. Population, 10,000.

**ACROBAT** (from *ἀκροβάτω*, to walk on tiptoe), a rope-dancer. Evidence exists that there were very skilful performers on the tight-rope (*funambuli*) among the ancient Romans. Modern acrobats generally use a long pole, loaded at the ends, and by shifting this are enabled to maintain, or readily to recover, their equilibrium. By an extension of the meaning of the term, acrobatic-feats now include trapeze leaping and similar performances.

**ACROCERAUNIA**, in *Ancient Geography*, a promontory in the N.W. of Epirus, which terminates the Montes Ceraunii, a range that runs S.E. from the promontory along the coast for a number of miles, and is supposed to have derived its name from being often struck with lightning. The cape (now called *Glossa* by the Greeks, and *Linguetta* by the Italians) is in lat. 40° 25' N.

**ACROGENÆ** is the name applied to a division of acoty ledonous or cryptogamous plants, in which leaves are present along with vascular tissue. In the higher divisions of Acrogens, as ferns and lycopods, the tissue consists of scalariform vessels, while in the lower divisions spiral cells are observed, which take the place of vessels. The term Acrogen means summit-grower, that is, a plant in which the stem increases specially by the summit. This is not, however, strictly accurate.

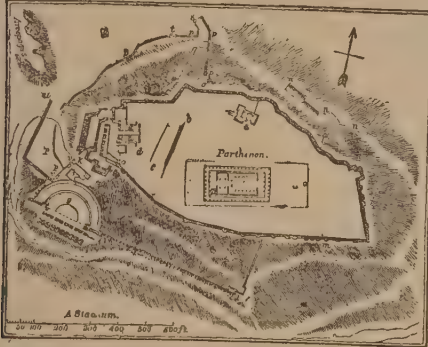
**ACROLITH** (*ἀκρόλιθοι*), statues of a transition period in the history of plastic art, in which the trunk of the figure was of wood, and the head, hands, and feet of marble. The wood was concealed either by gilding or, more commonly, by drapery, and the marble parts alone were exposed. Acroliths are frequently mentioned by Pausanias, the best known specimen being the Minerva Areia of the Plateaus.

**ACRON**, a celebrated physician, born at Agrigentum in Sicily, who was contemporary with Empedocles, and must therefore have lived in the 5th century before Christ. The successful measure of lighting large fires, and purifying the air with perfumes, to put a stop to the pestilence that raged in Athens (430 B.C.), is said to have originated with him; but this has been questioned on chronological grounds. Pliny is mistaken in saying that Acron was the founder of the sect of the Empirici, which did not exist until the 3d century before Christ. The error probably arose from a desire on the part of the sect to establish for itself a greater antiquity than that of the Dogmatici. Suidas gives the titles of several works written by Acron.



on medical subjects, in the Doric dialect, but none of these now exist.

ACROPOLIS (Ἀκρόπολις), a word signifying the upper town, or chief place of a city, a citadel, usually on the summit of a rock or hill. Such buildings were common in Greek cities; and they are also found elsewhere, as in the case of the Capitol at Rome, and the Antonia at Jerusalem; but the most celebrated was that at Athens, the remains of which still delight and astonish travellers. It was enclosed by walls, portions of which show traces of extreme antiquity. It had nine gates; the principal one was a splendid structure of Pentelican marble, in noble Doric architecture, which bore the name of *Propylæa*. Besides other beautiful edifices, it contains the Παρθενών, or temple of the virgin goddess Athene, the most glorious monument of ancient Grecian architecture.



Ground plan of the Acropolis of Athens.

- a. Pedestal of Rome and Augustus.
- b, c, d. Sites of temples of Minerva, Diana, and Venus.
- e. Erechtheum.
- f. Dionysiac theatre.
- g. Odeon of Harodes.
- h and i. Grottoes.
- k. Ruined mosque.

- l, k. Gate and portico.
- m. Choric monument of Thraseyas, now church of our lady of the grotto.
- n, o. Remains of Pelagic wall.
- p, q. Walls of outworks, &c.
- r. Gate to Propylæa.
- s, r, k. Forts.
- t, v. Ancient walls.

ACROSTIC (from ἄκρος and στῖχος, meaning literally the extremity of a verse), is a species of poetical composition, so constructed that the initial letters of the lines, taken consecutively, form certain names or other particular words. This fancy is of considerable antiquity, one of the most remarkable examples of it being the verses cited by Lactantius and Eusebius in the 4th century, and attributed to the Erythraean sibyl, the initial letters of which form the words Ἰησοῦς Χριστὸς Θεοῦ υἱὸς σωτήρ: "Jesus Christ, the Son of God, the Saviour," with the addition, according to some, of σταυρός, "the cross." The initials of the shorter form of this again make up the word ἰχθύς, to which a mystical meaning has been attached (Augustine, *De Civitate Dei*, 18, 23), thus constituting another kind of acrostic. The arguments of the comedies of Plautus, with acrostics on the names of the respective plays, are probably of still earlier date. Sir John Davies (1570-1626) wrote twenty-six elegant *Hymns to Astraea*, each an acrostic on "Elizabetha Regina;" and Mistress Mary Fage, in *Fame's Route*, 1637, commemorated 420 celebrities of her time in acrostic verses. The same form of composition is often to be met with in the writings of more recent versifiers. Sometimes the lines are so combined that the final letters as well as the initials are significant. Edgar Allan Poe, with characteristic ingenuity, worked two names—one of them that of Frances Sargent Osgood—into verses in such a way that the letters of the names corresponded to the first letter of the first line, the second letter of the second, the third letter of the third, and so on.

Generally speaking, acrostic verse is not of much value, and is held in slight estimation. Dr Samuel Butler says, in his "Character of a Small Poet," "He uses to lay the outsides of his verses even, like a bricklayer, by a line of rhyme and acrostic, and fill the middle with rubbish." Addison (*Spectator*, No. 60) found it impossible to decide whether the inventor of the anagram or the acrostic were the greater blockhead; and, in describing the latter, says, "I have seen some of them where the verses have not only been edged by a name at each extremity, but have had the same name running down like a seam through the middle of the poem." And Dryden, in *Mac Flecknoe*, scornfully assigned Shadwell the rule of

"Some peaceful province in acrostic land."

The name acrostic is also applied to alphabetical or "abecedarian" verses. Of these we have instances in some of the Hebrew psalms (e.g., Ps. xxv. and xxxiv.), the successive verses of which begin with the letters of the alphabet in their order. The structure of Ps. cxix. is still more elaborate, each of the verses of each of the twenty-two parts commencing with the letter which stands at the head of the part in our English translation. Alphabetical verses have been constructed with every word of the successive lines beginning with the successive letters of the alphabet.

By an extended use of the term acrostic, it is applied to the formation of words from the initial letters of other words. Ἰχθύς, referred to above, is an illustration of this. So also is the word "Cabal," which, though it was in use before, with a similar meaning, has, from the time of Charles II., been associated with a particular ministry, from the accident of its being composed of Clifford, Ashley, Buckingham, Arlington, and Lauderdale. Akin to this are the names by which the Jews designated their Rabbis; thus Rabbi Moses ben Maimon (better known as Maimonides), was styled "Rambam," from the initials R. M. B. M.; Rabbi David Kimchi (R. D. K.), "Radak," &c.

A species of puzzle, scarcely known twenty years ago, but very common now (see *English Catalogue*, 1863-71, s. v. Acrostics), is a combination of enigma and double acrostic, in which words are to be guessed whose initial and final letters form other words that are also to be guessed. Thus Sleep and Dream may have to be discovered from the first and last letters of Sound, Lover, Europe, Elia, and Palm, all expressed enigmatically.

ACT, in *Dramatic Literature*, signifies one of those parts into which a play is divided to mark the change of of time or place, and to give a respite to the actors and to the audience. In Greek plays there are no separate acts, the unities being strictly observed, and the action being continuous from beginning to end. If the principal actors left the stage the chorus took up the argument, and contributed an integral part of the play, though chiefly in the form of comment upon the action. When necessary, another *drama*, which is etymologically the same as an *act*, carried on the history to a later time or in a different place, and thus we have the Greek trilogies or groups of three dramas, in which the same characters reappear. The Roman poets first adopted the division into acts, and suspended the stage business in the intervals between them. Their number was usually five, and the rule was at last laid down by Horace in the *Ars Poetica*—

"Neve minor, neu sit quinto productior actu  
Fæbula, quæ posci vult, et spectata reponi."

"If you would have your play deserve success,  
Give it five acts complete, nor more nor less."

—Francis.

On the revival of letters this rule was almost universally observed by dramatists and that there is an inherent con-

venience and fitness in the number five is evident from the fact that Shakespeare, who refused to be trammelled by merely arbitrary rules, adopts it in all his plays. Some critics have laid down rules as to the part each act should sustain in the development of the plot, but these are not essential, and are by no means universally recognised. In comedy the rule as to the number of acts has not been so strictly adhered to as in tragedy, a division into two acts or three acts being quite usual since the time of Molière, who first introduced it.

It may be well to mention here Milton's *Samson Agonistes* as a specimen in English literature of a dramatic work founded on a purely Greek model, in which, consequently, there is no division into acts.

ACT, in *Law*, is an instrument in writing for declaring or justifying the truth of anything; in which sense records, decrees, sentences, reports, certificates, &c., are called *acts*. The origin of the legal use of the word *Act* is in the *acta* of the Roman magistrates or people, of their courts of law, or of the senate, meaning (1) what was done before the magistrates, the people, or the senate; (2) the records of such public proceedings.

ACT OF PARLIAMENT. An Act of Parliament may be regarded as a declaration of the Legislature, enforcing certain rules of conduct, or defining rights and conferring them upon or withholding them from certain persons or classes of persons. The collective body of such declarations constitutes the statutes of the realm or written law of the nation, in the widest sense, from Anglo-Saxon times to the present day. It is not, however, till Magna Charta that, in a more limited constitutional sense, the statute-book is generally held to open, and the Parliamentary records only begin to assume distinct outlines late in the reign of Edward I. The maladministration of the common law by the royal judges had gradually taught the people the necessity of obtaining written declarations of their rights—often acknowledged, still oftener violated. Inensibly almost, the Commons, whose chief function it originally was to vote supplies to the crown, began to couple their grants with petitions for the redress of grievances. The substance of these petitions and of the royal responses was in time made the groundwork of Acts which, as framed by court redactors, and appearing annexed to proclamation-writs after the dissolution of Parliament, were frequently found seriously to misrepresent its will. To check this evil an Act was passed (8 Henry IV.), authorising the Commons to be represented at the engrossing of the Parliament roll; but even this surveillance was not enough, for in the beginning of the reign of Henry V. it was enacted, at the instance of the Commons, that in regard to their petitions the royal prerogative should in future be limited to granting or refusing them *simpliciter*. In this way it became a fixed constitutional principle that an Act of Parliament, to be valid, must express concurrently the will of the entire Legislature. It was not, however, till the reign of Henry VI. that it became customary, as now, to introduce bills into Parliament in the form of finished Acts; and the enacting clause, regarded by constitutionalists as the first perfect assertion, in words, of popular right, came into general use as late as the reign of Charles II. It is thus expressed:—"Be it enacted by the King's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal and Commons in this present Parliament assembled, and by the authority of the same." The use of the preamble with which Acts are usually prefaced, is thus quaintly set forth by Lord Coke,—"The rehearsal or preamble of the statute is a good means to find out the meaning of the statute, and, as it were, a key to open the understanding thereof." Originally, the collective Acts of each session formed but one statute, to

which a general title was attached, and for this reason an Act of Parliament is always cited as the chapter of a particular statute—*e.g.*, 24 and 25 Vict. c. 101. Titles were, however, prefixed to individual Acts as early as 1488. Since 33 Geo. III. c. 13, an Act of Parliament is complete whenever it receives the royal assent, and takes effect from that date, unless the Act itself fix some other. British Acts require no formal promulgation, for it is presumed that every subject of the realm is cognisant of the resolutions of Parliament, either by himself or his representative therein.

Modern Acts of Parliament are—1. *Public*. These are binding on all citizens, and are *ex officio* cognisable by the judges. Since 1850 every Act is held to be public unless the contrary be expressly declared. 2. *Private Acts*. These relate to particular classes, persons, or places. Private Acts are (1.) Personal, viz., those which relate to name, naturalisation, estate, &c., of particular persons. (2.) Local, affecting bridges, canals, docks, turnpikes, railways, &c. To prevent such Acts from being unduly passed, the promoters of private bills are required to comply with the standing orders of the two Houses, by which private bill procedure is regulated. Acts of Parliament, for convenience of reference, are classified as Public General Acts, Local and Personal Acts declared Public, Private Acts printed, and Private Acts not printed. Public General Acts (if no exception be expressed), extend to Great Britain and Ireland, exclusively only of the Channel Islands and the Isle of Man.

The first complete edition of English Acts of Parliament published by state authority appeared between the years 1810 and 1824. It includes the early charters, and ends with the reign of Queen Anne. Many private editions of the statutes had appeared previous to that of the Record Commissioners. The practice of printing Acts of Parliament commenced in the reign of Richard III. The charters and Acts were written in Latin till the *Statutum de Scaccario*, 51 Henry III. (1266), which is in French. The Acts of Edward I. are indiscriminately in Latin or French; but from the fourth year of Henry VII. Acts are exclusively in English.

*Scotch Acts*.—The earliest attempts at a written record of the proceedings of the Parliament of Scotland consisted of detached instruments or indentures, and the next step was the entering of these detached instruments on a roll for more permanent preservation. No such record, however, is preserved before the disputed succession, which commenced in 1289. The earliest roll of *placita in parlamento* is dated 1292; but the *Blak Buik*, containing a series of proceedings in Parliament from 1367 to 1402, is the most important of the earliest records of Parliament. The original books of Parliament of the reigns of James I. and James II. are not preserved, but from the year 1466 down to the Union a voluminous, but not unbroken, series has been preserved. Down to the reign of James V., scarcely any Act in the original registers is distinguished by a title or rubric; and even after that period the practice has not in this respect been uniform. In like manner there is no numeration of the Acts of Parliament during this period. The language of the earliest Scotch records is in Latin; but as early as 1398 some of the proceedings of Parliament or the Council-General were written in Scots, and subsequently to 1424 always in that language. Unlike the English Acts, French was never used in Scotch legislation. In 1541 a selection of the Acts of James V. was printed. The first edition of the Acts was published in 1566, the second in 1597, the third in 1681; and the great national work, the complete record of Parliament, has just been completed, with a general index to the whole Acts from 1124 to 1707, which forms the great repertory of the legal, constitutional, and political history of Scotland. In 1540 an Act was passed requiring all the Acts of Parliament to be pronounced in presence of the king and the estates,—the assent of the king being indicated by his touching them with the sceptre; and in 1641 it was ordained that the Acts passed in 1640 be published in the king's name, and with the consent of the estates. But during the civil war the Acts of Parliament were passed in name of the estates alone. These Acts, however, were rescinded after the restoration of Charles II. by Act 1661, c. 126, because "the power of making laws is an essential privilege of the royal prerogative." In 1457 an Act was passed for proclaiming the Acts of Parliament in the shires and burghs, that none be ignorant; and in 1531 it was ordained that Acts need not be proclaimed at the market-cross of the head burgh of each shire, but at the market-cross of Edinburgh only, the lieges obeying them forty days thereafter. The clerk of register was always bound to give extracts of Acts to the lieges in their particular affairs. In 1425 a committee, consisting of an equal number of each estate, was appointed to amend the books of law; and in 1567 a commission was issued to codify the laws, civil and municipal, dividing them into heads like the Roman law,—the heads as they are ready to be brought to Parliament to be confirmed. Lord Bacon recommended the Scotch Acts for their "excellent brevity." His lordship's praise applies very properly to the Acts down to the



reign of Queen Mary and the early part of the reign of James VI.; but the logomachy of subsequent legislation is intolerable to the consulter.

*Irish Acts* may be said to commence A.D. 1810, in the reign of Edward II., and to close with the union with the British Parliament in 1801. From the former date, however, there is a break till 1429. In 1496 *Poynting's Law* provided that no bill should be introduced into the Irish Parliament which has not previously received the royal assent in England; and till 1782 the Parliament of Ireland remained in tutelage to that of England. Since 1801 it has been incorporated with the Parliament of Great Britain.

**ACT OF SEDERUNT**, in *Scotch Law*, an ordinance for regulating the forms of procedure before the Court of Session, passed by the judges in virtue of a power conferred by an Act of the Scotch Parliament, 1540, c. 93. In former times this power was in several instances clearly exceeded, and such Acts of Sederunt required to be ratified by the Scotch Parliament; but for more than a century and a half Acts of Sederunt have been almost exclusively confined to matters relating to the regulation of judicial procedure. Many recent statutes contain a clause empowering the court to make the necessary Acts of Sederunt. A quorum of nine judges is required to pass an Act of Sederunt.

**ACTS OF THE APOSTLES**, the fifth among the canonical books of the New Testament. What has to be said on this book will naturally fall under the following heads: The state of the text; the authorship; the object of the work; the date and the place of its composition.

*The State of the Text.*—The Acts is found in two MSS. generally assigned to the 4th century, the *Codex Sinaiticus*, in St Petersburg, and the *Codex Vaticanus*, in Rome; in one MS. assigned to the 5th century, the *Codex Alexandrinus*, in the British Museum; in two MSS. belonging to the 6th century, the *Codex Beza*, in Cambridge, and the *Codex Laudianus*, in Oxford; and in one of the 9th century, the *Codex Palimpsestus Porfirianus*, in St Petersburg, with the exception of chapter first and eight verses of chapter second. Large fragments are contained in a MS. of the 6th century, the *Codex Ephraemi*, in Paris. Fragments are contained in five other MSS., none of which is later than the 9th century. These are all the uncial MSS. containing the Acts or portions of it.

The MSS. in Oxford and Cambridge differ widely from the others. This is especially the case with the Cambridge MS., the *Codex Beza*, which is said to contain no less than six hundred interpolations. Scrivener, who has edited this MS. with great care, says, "While the general course of the history and the spirit of the work remain the same as in our commonly received text, we perpetually encounter long passages in *Codex Beza* which resemble that text only as a loose and explanatory paraphrase recalls the original form from which it sprung; save that there is no difference in the language in this instance, it is hardly an exaggeration of the facts to assert that Codex D [i.e., *Codex Beza*] reproduces the *textus receptus* of the Acts much in the same way that one of the best Chaldean Targums does the Hebrew of the Old Testament, so wide are the variations in the diction, so constant and inveterate the practice of expanding the narrative by means of interpolations." Scrivener here assumes that the additions of the *Codex Beza* are interpolations, and this is the opinion of nearly all critics. There is one, however, Bornemann, who thinks that the *Codex Beza* contains the original text, and that the others are mutilated. But even supposing that we were quite sure that the additions were interpolations, the *Codex Beza* makes it more difficult to determine what the real text was. Scrivener, with good reason, supposes that the *Codex Beza* is derived from an original which would most likely belong to the third century at the latest.

*Authorship of the Work.*—In treating this subject we begin with the external evidence.

The first mention of the authorship of the Acts in a well-authenticated book occurs in the treatise of Irenæus against heresies, written between the years 182 and 188 A.D. Irenæus names St Luke as the author, as if the fact were well known and undoubted. He attributes the third Gospel to him, and calls him "a follower and disciple of apostles" (H. iii. 10, 1). He states that "he was inseparable from Paul, and was his fellow-worker in the gospel" (H. iii. 14, 1). The next mention occurs in the *Stromata* of Clemens Alexandrinus, written about 195 A.D., where part of St Paul's speech to the Athenians is quoted with the words, "Even as Luke also, in the Acts of the Apostles, records Paul as saying" (*Strom.* v. xii. 82, p. 696, Pott). The Acts of the Apostles is quoted by Tertullian as Scripture, and assigned to St Luke (*Adv. Mar.* v. 2 and 3). Origen speaks of "Luke who wrote the Gospel and the Acts" (Eus. H. E. vi. 25); and Eusebius includes the Acts of the Apostles in his summary of the books of the New Testament (*Hist. Eccl.* iii. 25). The Muratorian canon, generally assigned to the end of the second or beginning of the third century, includes the Acts of the Apostles, assigns it to St Luke, and says that he was an eye-witness of the facts recorded. There is thus unanimous testimony up to the time of Eusebius that St Luke was the author of the Acts. This unanimity is not disturbed by the circumstance that some heretics rejected the work, for they did not deny the authorship of the book, but refused to acknowledge it as a source of dogmatic truth.

After the time of Eusebius we find statements to the effect that the Acts was little known. "The existence of this book," Chrysostom says, "is not known to many, nor the person who wrote and composed it." And Photius, in the ninth century, says, "Some maintain that it was Clement of Rome that was the writer of the Acts, others that it was Barnabas, and others that it was Luke the Evangelist."

Irenæus makes such copious quotations from the Acts that we can feel sure that he had before him substantially our Acts. We cannot go further back than Irenæus with certainty. If, as we shall see, the writer of the Acts was also the writer of the third Gospel, we have Justin Martyr's testimony (about 150 A.D.) for the existence of the third Gospel in his day, and therefore a likelihood that the Acts existed also. But we have no satisfactory evidence that Justin used the Acts, and there is nothing in the Apostolic Fathers, nor in any work anterior to the *Letter of the Churches of Vienne and Lyons*, written probably soon after 177 A.D., to prove the existence of the Acts.

The weight of external evidence therefore goes entirely for St Luke as the author of the Acts. But it has to be noticed, that the earliest testimony is more than a hundred years later than the events described in the Acts. We have also to take into account that Irenæus was not critical. We find him calling the *Pastor of Hermas* Scripture; Clemens Alexandrinus also calls the *Pastor* inspired; and Origen not merely attributes inspiration to the work, but makes the author of it the Hermas mentioned in the Epistle to the Romans. All scholars reject the testimony of Irenæus, Clemens Alexandrinus, and Origen in this matter. The question arises, How far are we to trust them in others of a similar nature?

We turn to the internal evidence. And in the very commencement we find the author giving himself out as the person who wrote the third Gospel. This claim has been almost universally acknowledged. There is a remarkable similarity of style in both. The same peculiar modes of expression continually occur in both; and throughout both there exist continual references backward and for-

ward, which imply the same authorship. There are some difficulties in the way of this conclusion. Two of these deserve special notice. If we turn to the last chapter of the Gospel, we find it stated there (ver. 13) that two disciples met Jesus on the day of the resurrection, as they were going to Emmaus. Towards nightfall (ver. 29) he entered the village with them; and as he reclined with them, he became known to them, and disappeared. Whereupon "at that very hour" (ver. 33) they rose up and returned to Jerusalem. They found the eleven assembled, and told them what had happened to them. "While they were saying these things, he himself stood in the midst of them" (ver. 36). The apostles gave him a piece of fish, and he ate it. "But he said to them" (ver. 44), so the narrative goes on, and it then relates his speech; and at ver. 50 it says, "He led them out to Bethany," and then disappeared from them. This disappearance was final; and if the words used in the Gospel make us hesitate in determining it to be his ascension, such hesitation is removed by the opening words of the Acts. According to the Gospel, therefore, all the events now related took place, or seem to have taken place, on the day of the resurrection, or they may possibly have extended into the next morning, but certainly not later. The Acts, on the contrary, states that Jesus was seen by the disciples for forty days, and makes him deliver the speech addressed to his disciples and ascend into heaven forty days after the resurrection. The other instance is perhaps still more singular. In the Acts we have three accounts of the conversion of St Paul—the first by the writer himself, the other two by St Paul in his speeches. The writer states that (ix. 4, 7) when the light shone round Paul, he fell to the ground, "but the men who were journeying with him stood dumb." St Paul himself says (xxvi. 14) that they all fell to the ground. The writer says (ix. 7) that St Paul's companions heard the voice, but saw no one. St Paul himself says (xxii. 9) that his companions saw the light, but did not hear the voice of him who spake to him. And finally, all these accounts differ in their report of what was said on the occasion. Notwithstanding these differences, even these very accounts contain evidence in them that they were written by the same writer, and they do not destroy the force of the rest of the evidence. The case would be quite different if Baur, Schwegler, and Wittichen were right in supposing that the Gospel of Luke contained documents of opposite tendencies. It would then be necessary to assume different authors for the different parts of the Gospel, and still another for the Acts. But this theory falls to the ground if the Tübingen theory of tendencies is rejected.

The Acts itself claims to be written by a companion of St Paul. In chap. xvi. 10, the writer, without any previous warning, passes from the third person to the first. St Paul had reached the Troad. There he saw a vision inviting him to go to Macedonia. "But when he saw the vision, straightway we sought to go out into Macedonia." The use of the "we" continues until Paul leaves Philippi. In chap. xx. Paul returns to Philippi, and the "we" is resumed, and is kept up till the end of the work. Irenæus (*H. iii. 14, 1*) quotes these passages as proof that Luke, the author, was a companion of the apostle. The minute character of the narrative, the accurate description of the various journeyings, the unimportance of some of the details, and the impossibility of contriving all the incidents of the shipwreck without experiencing them, are strong reasons for believing that we have the narrative of an eye-witness. And if we allow this much, we can scarcely help coming to the conclusion that this eye-witness was the author of the work; for the style of this eye-witness is exactly the style of the writer who composed the previous portions. Some have supposed that we have here the per-

sonal narrative of Timothy or of Silas; but this supposition would compel us to believe that the writer of the Acts was so careless as to tack documents together without remembering to alter their form. Such a procedure on the part of the skilful writer of the Acts is unlikely in the highest degree. The "we" is introduced intentionally, and can be accounted for only in two ways: either by supposing that the writer was an eye-witness, or that he wished to be thought an eye witness, and borrowed the narrative of an eye-witness to facilitate the deception. Zeller has adopted this latter alternative; and this latter alternative is the only possible one for those who assign a very late date to the Acts.

We may test the writer's claim to be regarded as a companion of St Paul by comparing his statements with those of the other books of the New Testament. As might be expected, the great facts recorded in the Gospels are reproduced accurately in the Acts. There is only one marked difference. St Matthew says (xxvii. 5, 7) that Judas cast the traitor's money into the temple, and the priests bought with it a field for the burial of strangers. St Peter in Acts (i. 18) says, that Judas himself purchased a field with the reward of his iniquity. St Matthew says that he went and hanged himself, St Peter that he fell headlong and burst in the middle. St Matthew says, or rather seems to say, that the field was called the field of blood, because it was purchased with blood-money; St Peter seems to attribute the name to the circumstance that Judas died in it.

The Acts is divided into two distinct parts. The first deals with the church in Jerusalem, and especially narrates the actions of St Peter. We have no external means of testing this portion of the narrative. The Acts is the only work from which information is got in regard to these events. The second part pursues the history of the apostle Paul; and here we can compare the statements made in the Acts with those made in the Epistles. Now here again we have a general harmony. St Paul travels in the regions where his Epistles show that he founded churches. The friends of St Paul mentioned in the Acts are also the friends acknowledged in the Epistles. And there are many minute coincidences. At the same time, we learn from this comparison that St Luke is not anxious to give minute details. Timothy probably visited Athens while St Paul was there. Thence we learn from 1 Thess. iii. 1, but no mention is made of this visit in the Acts. Again, we gather from the Epistles to the Corinthians that St Paul paid a visit to Corinth, which is not recorded in the Acts. Moreover, no mention is made of Titus in the Acts. These, however, are slight matters; and it must be allowed that there is a general agreement. But attention has been drawn to two remarkable exceptions. These are the account given by St Paul of his visits to Jerusalem in the Epistle to the Galatians and that given by St Luke; and the character and mission of the apostle Paul, as they appear in his letters and as they appear in the Acts.

In regard to the first point, St Paul himself says in the Epistle to the Galatians, that after his conversion straightway he held no counsel with flesh and blood, nor did he go up to Jerusalem to the apostles who were before him; but he went away to Arabia and returned to Damascus; that then after three years he went up to Jerusalem to seek for Cephas, and he remained with him fourteen days. He at that time saw only two apostles,—Peter, and James the brother of the Lord. He then went away to Syria and Cilicia, and was unknown by face to the churches of Judea. He says that fourteen years after this he went up to Jerusalem with Barnabas, taking Titus with him. On this occasion he went up by revelation. St Paul introduces these facts for a purpose, and this purpose is that he might prove his independence as an apostle. He had acted



solely on the revelation given to himself. He had neither required nor obtained sanction from the other apostles. He was an apostle, not sent forth from men nor through men, but through Jesus and God. When we turn to the Acts, we find that no mention is made of the journey to Arabia. He stays some days at Damascus, and then begins to preach the gospel. He continues at this work a considerable time; and then, in consequence of the plots of the Jews, he secretly withdraws from Damascus and proceeds to Jerusalem. The brethren there are suspicious in regard to him, and their fears are not quieted until Barnabas takes him to the apostles; and after this introduction he goes in and out amongst them, and holds discussions with the Hellenists. Finally, when the Hellenists attempt to kill him, the brethren send him to Tarsus. In the Epistle to the Galatians St Paul does everything for himself, instigated by his inward feelings. In the Acts he is forced out of Antioch, and sent by the brethren to Tarsus. In the Galatians St Paul stays only a fortnight, and sees only St Peter and St James of the apostles, and was unknown by face to the churches of Judea. In the Acts Barnabas takes him to the apostles, and he continues evidently for a period much longer than a fortnight, going in and out amongst them. Then in chap. xi. 30, he goes up a second time to Jerusalem,—a visit which seems inconsistent with the narrative in the Epistle to the Galatians. And finally, when he goes up to Jerusalem, the Acts does not represent him going up by an independent revelation, but as being sent up; and it says nothing of his taking an independent part, but represents him as submitting to the apostles.

This, however, leads us to the treatment of the character of St Paul by the writer of the Acts. Some of the Tübingen critics assert that the writer shows ill-will to St Paul, but they are evidently wrong. On the contrary, the character of the apostle as given in the Acts is full of grand and noble traits. Yet still there are some singular phenomena in the Acts. St Paul claimed to be an apostle by the will of God. He had as good a right to be an apostle as St Peter or St James. Yet the writer of the Acts never calls him an apostle in the strict sense of the term. He is twice called an apostle, namely, in Acts xiv. 4 and 14. On both occasions his fellow-apostle is Barnabas; but Barnabas was not one of the twelve, and not an apostle in the strict sense of the term. And even in these verses the reading is doubtful. The *Codex Bezae* omits the word *apostle* in the 14th verse, and makes the 4th liable to suspicion by inserting an addition to it. St Luke also brings prominently forward as the proper mark of an apostle, that he should have companied with the Lord from his baptism to his ascension, and describes the filling up of the number of the twelve by the election of Matthias. And if St Luke's narrative of St Paul's conversion be minutely examined, it will be perceived that not only does he not mention that St Paul saw Jesus, but the circumstances as related scarcely permitted St Paul to see Jesus. He was at once dazzled by the light, and fell to the ground. In this prostrate condition, with his eyes shut, he heard the voice; but at first he did not know whose it was. And when he opened his eyes, he found that he was blind. The words of Ananias imply that St Paul really did see Jesus, but St Luke abstains from any such statement. And St Paul is not treated by the Jewish Christians in the Acts as an independent apostle. He is evidently under submission to the apostles at Jerusalem.

Furthermore, the point on which St Paul specially insists in the Epistle to the Galatians is, that he was appointed the apostle to the Gentiles as St Peter was to the circumcision, and that circumcision and the observance of the Jewish law were of no importance to the Christian. St Paul's words on this point in all his letters are strong and decided. But in

the Acts it is St Peter that opens up the way for the Gentiles. In St Peter's mouth occurs the strongest language in regard to the intolerable nature of the law. Not a word is said of the quarrel between St Peter and St Paul. The brethren in Antioch send St Paul and Barnabas up to Jerusalem to ask the opinion of the apostles and elders. St Paul awaits the decision of the apostles, and St Paul and Barnabas carry back the decision to Antioch. And throughout the whole of the Acts St Paul never stands forth as the champion of the Gentiles. He seems continually anxious to reconcile the Jewish Christians to himself, by observing the law of Moses. He circumcises Timothy, and he performs his vows in the temple. And he is particularly careful in his speeches to show how deep his respect for the law of Moses is. In this regard the letters of St Paul are very different from his speeches as given in the Acts. In the Epistle to the Galatians he claims perfect freedom for himself and the Gentiles from the observance of the law; and neither in it nor in the Epistle to the Corinthians does he take any notice of the decision to which the apostles are said to have come in their meeting at Jerusalem. And yet the narrative of St Luke implies a different state of affairs from that which it actually states in words; for why should the Jews hate St Paul so much more than the other apostles if there was nothing special in his attitude towards them?

We may add to this, that while St Luke gives a rather minute account of the sufferings of St Peter and the church in Jerusalem, he has not brought prominently forward the perils of St Paul. St Paul enumerates some of his sufferings in the second Epistle to the Corinthians (chap. xi. 23–28). St Luke has omitted a great number of these. Thus, for instance, St Paul mentions that he was thrice shipwrecked. St Luke does not notice one of these shipwrecks, that recorded in the Acts having taken place after the Epistles to the Corinthians were written. Some also think that St Luke details several occurrences which are scarcely in harmony with the character of St Paul. They say that the dismissal of John Mark, as recorded in the Acts, is a harsh act. St Paul's remark, "I wist not that he is the high priest" (xxiii. 5), they regard as doubtful in point of honesty. And the way by which he gained the Pharisees to his side, in opposition to the Sadducees, they describe as an expedient unworthy the character of this fearless apostle (xxiii. 6).

St Luke occasionally alludes, in the Acts, to events which took place outside of the church. We can test his accuracy in recording these events by comparing his narrative with the narratives of historians who treat of the same period. These historians are Josephus, Tacitus, and Suetonius. Now, here again we find that the accounts in the Acts generally agree. Indeed, Holtzmann has noticed that all the external events mentioned in the Acts are also to be found in Josephus. We may therefore omit Tacitus and Suetonius, and confine ourselves to Josephus. Three narratives deserve minute examination. The first is the death of Herod Agrippa. Josephus says (*Ant.* xix. 8, 2) that Herod was at Caesarea celebrating a festival in honour of the Caesar. On the second day of the spectacle, the king put on a robe made entirely of silver, and entered the theatre early in the day. The sun's rays fell upon the silver, and a strong impression was produced on the people, so that his flatterers called out that he was a god. He did not check their impiety, but soon, on looking up he saw an owl perched above his head on a rope. He at once recognised in the bird the harbinger of evil. Immediately he was attacked by violent pains in the bowels, and after five days' illness died. The Acts says that Herod was addressing a deputation of Tyrians and Sidonians in Caesarea, seated on the tribunal and arrayed in a royal

roba. The people called out, "The voice of a god, and not of a man." "Immediately an angel of the Lord struck him because he gave not God the glory, and becoming worm-eaten, he died" (xii. 21-23). Both accounts agree in representing Herod as suddenly struck with disease because he did not check the impiety of his flatterers, but they agree in almost nothing else; and it is difficult to conceive that the one writer knew the account of the other. Which account is most to be trusted, depends upon the answer given to the question which is the more credible historian.

The second case relates to the Egyptian mentioned in the question of the tribute to St Paul, in Acts xxi. 38, "You are not then the Egyptian who, some time ago, made a disturbance, and led into the wilderness the four thousand of the sicarii?" Josephus mentions this Egyptian, both in his *Antiquities* (xx. 8, 6) and in the *Jewish War* (ii. 13, 5). In the *Jewish War* (ii. 13, 3), Josephus describes the sicarii, and then passes on, after a short section, to the Egyptian. He states that he collected thirty thousand people, led them out of the wilderness "to the mount called the Mount of Olives, which," he says (*Ant.* xx. 8, 6) in words similar to those in Acts i. 12, "lies opposite to the city five furlongs distant." On this Felix attacked him, killed some, captured others, and scattered the band. The Egyptian, however, escaped with some followers. Hence the question in the Acts. There are some striking resemblances between the words used by both writers. The numbers differ; but St Luke gives the numbers of the sicarii, Josephus the numbers of the entire multitude led astray.

The third case is the one which has attracted most attention. In the speech which Gamaliel delivers, in Acts v. 35-39, it is said, "Some time before this, Theudas rose up, saying that he was some one, to whom a number of about four hundred men attached themselves, who was cut off, and all who followed him were broken up and came to nought. After him rose up Judas the Galilean, in the days of the registration, and he took away people after him; and he also perished, and all that followed him were scattered." On turning to Josephus we find that both Theudas and Judas the Galilean are mentioned. The circumstances related of both are the same as in the Acts, but the dates are different. According to Josephus, Theudas gave himself out as a prophet, in the reign of Claudius, more than ten years after the speech of Gamaliel had been delivered, while Judas appeared at the period of the registration, and therefore a considerable time before Theudas. To explain this difficulty, some have supposed that there may have been another Theudas not mentioned by Josephus, or that Josephus is wrong in his chronology. Others suppose that St Luke made a mistake in regard to Theudas, and is right in regard to Judas. Keim maintains that St Luke has made the mistake, and suggests that possibly it may be based upon the passage of Josephus; and Holtzmann has gone more minutely into this argument. Holtzmann draws attention to the nature of the sections of Josephus which contain the references to Theudas and Judas (*Ant.* xx. 5, 1, 2). He says that nearly all the principal statements made in these short sections emerge somewhere in the Acts: the census of Quirinus, the great famine, Alexander as a member of a noble Jewish family, and Ananias as high priest. Moreover, St Luke has preserved the order of Josephus in mentioning Theudas and Judas; but Josephus says "the sons of Judas," whereas St Luke says "Judas." "Is it not likely," Holtzmann argues, "that St Luke had before him mind this passage of Josephus, but forgot that it was the sons of Judas that were after Theudas, and not the father?" He adds also, that in the short passage in the Acts there are five peculiar expressions, identical or nearly identical

with the expressions used by Josephus, and comes to the conclusion that St Luke knew the works of Josephus. He finds further traces of this knowledge in the circumstance that, in Acts xiii. 20-21, St Luke agrees in his statements with Josephus where both differ from the Old Testament. He also adduces certain Greek words which he supposes St Luke derived from his reading of Josephus. Max Krenkel, in making an addition to this argument, tries to show, from a comparison of passages, that St Luke had Josephus before his mind in the narrative of the childhood of Christ; and he supposes that the expedient attributed to the apostle Paul, of setting the Pharisees against the Sadducees (Acts xxiii. 6), is based upon a similar narrative given in Josephus (*Bell. Jud.* ii. 21, 3, and *Vita*, 26 ff.). The importance of this investigation is great; for if Holtzmann and Krenkel were to prove their point, a likelihood would be established that the Acts of the Apostles, or at least a portion of it, was written after 93 A.D., the year in which the *Antiquities* of Josephus was published, according to a passage occurring in the work itself. Meanwhile, the fact that important portions of the narrative must have been written by an eye-witness of the events recorded, combined with the unity of style and purpose in the book, are cogent arguments on the other side.

The speeches in the Acts deserve special notice. The question occurs here, Did St Luke follow the plan adopted by all historians of his age, or is he a singular exception? The historians of his age claimed the liberty of working up, in their own language, the speeches recorded by them. They did not dream of verbal accuracy; even when they had the exact words of the speakers before them, they preferred to mould the thoughts of the speakers into their own methods of presentation. Besides this, historians do not hesitate to give to the characters of their history speeches which they never uttered. The method of direct speech is useful in producing a vivid idea of what was supposed to pass through the mind of the speaker, and therefore is used continually to make the narrative lively. Now it is generally believed that St Luke has followed the practice of his contemporaries. There are some of his speeches that are evidently the summaries of thoughts that passed through the minds of individuals or of multitudes. Others unquestionably claim to be reports of speeches really delivered. But all these speeches have, to a large extent, the same style as that of the narrative. They have passed to a large extent through the writer's mind, and are given in his words. They are, moreover, all of them the merest abstracts. The speech of St Paul at Athens, as given by St Luke, would not occupy more than a minute and a half in delivery. The longest speech in the Acts, that of the martyr Stephen, would not take more than ten minutes to deliver. It is not likely that either speech lasted so short a time. But this circumstance, while destroying their verbal accuracy, does not destroy their authenticity; and it must strike all that, in most of the speeches, there is a singular appropriateness, there is an exact fitting-in of the thoughts to the character, and there are occasionally allusions of an obscure nature, which point very clearly to their authenticity. The one strong objection urged against this inference, is that the speeches of St Peter and St Paul show no doctrinal differences, such as are said to appear in the Epistles; but the argument has no force, unless it be proved that St Paul's doctrine of justification is different from the creed of St Peter or St James.

Not the least important of the questions which influence critics in determining the authorship of the Acts is that of miracles. Most of those who think that miracles are impossible, come to the conclusion that the narratives containing them are legendary, and accordingly they maintain that the first portion of the Acts, relating to the early



church in Jerusalem and to St Peter, is in the highest degree untrustworthy. The writer, it is maintained, had no personal knowledge of those early days, and received the stories after they had gone through a long process of transmutation. They appeal, for instance, to the account of the Pentecost, where the miracle of speaking with tongues is described. They say that it is plain, on a comparison of the Epistle to the Corinthians with the Acts, that St Paul meant one thing by the gift of tongues, and the writer of the Acts another. And the inference is at hand that, if the writer had known St Paul, he would have known what the gift of tongues was; and the possibility of such a mistake, it is said, implies a considerable distance from the time of the apostles and the primitive church. They point also to the curious parallelism between the miracles of St Peter and those of St Paul. St Peter begins his series of miracles by healing a lame man (iii. 2); so does St Paul (xiv. 8). St Peter exorcises evil spirits (v. 16; viii. 7); so does St Paul (xix. 15; xvi. 18). If St Peter deals with the magician Simon, St Paul encounters Elymas. If St Peter punishes with death (v. 1 ff.), St Paul punishes with blindness (xiii. 6 ff.). If St Peter works miracles by his shadow (v. 15), not less powerful are the aprons and napkins of St Paul (xix. 12). And, finally, if St Peter can raise Tabitha from the dead (ix. 36), St Paul is equally successful in the case of Eutychus (xx. 9). It is easy to see, also, that since there is no contemporary history with which to compare the statements in the Acts, and since many of the statements are of a summary nature, and very few dates are given, a critic who believes the narratives legendary will have no difficulty in finding many elements in the narratives confirmatory of his belief. But to those who believe in miracles the rest of the narrative seems plain and unvarnished. The parallelism between the miracles of St Peter and St Paul is accounted for by the fact that they acted in similar circumstances, and that actual events were at hand on which to base the parallelism. At the same time, some who believe in the possibility of miracles think that the Acts presents peculiar difficulties in this matter. They say that the healing by means of shadows and aprons is of a magical nature; that the death of Ananias and Sapphira, and the other destructive miracles, are out of harmony with the rest of the miracles of the New Testament; and that the earthquakes that release St Peter and St Paul seem purposeless. The difficulties on this head, though real, are not however of great importance, nor do they tell very seriously against the received opinion that St Luke is the author of the work.

We have thus given a general summary of the questions which come up in investigating the authorship of the Acts, and of the arguments used in settling this point. The conclusions based upon this evidence are very different. Some join the traditional opinion of the church to the modern idea of inspiration, and maintain that St Luke was the author of the work, that every discrepancy is merely apparent, and that every speech contains the real and genuine words of the speaker. Others maintain that St Luke is the writer, and that the book is justly placed in the canon; that the narrative is, on the whole, thoroughly trustworthy, and that neither its canonicity nor credibility is affected by the existence of real discrepancies in the narrative. Others hold that St Luke is the author, but that we have got in the book an ordinary narrative, with portions credible and portions incredible; that for the early portions of the work he had to trust mainly to his memory, dulled by distance from the scene of action and by lapse of time, and that he has given what he knew with the uncritical indifference to minute accuracy in time, circumstance, and word, which characterises all his contemporaries. Others maintain that St Luke is the author,

but that, being a credulous and unscientific Christian, he recorded indeed in honesty all that he knew, but that he was deluded in his belief of miracles, and is often inaccurate in his statement of facts. Others think that St Luke was not the author of the work. He may have been the original author of the diary of the Apostle Paul's travels in which the "we" occurs; but the author of the Acts did not write the diary, but inserted it into his narrative after altering it for a special purpose, and the narrative was written long after St Paul and St Luke were dead. Others think that in the Acts we have the work of Timothy or of Silas, or of some one else. A considerable number imagine that St Luke had different written documents before him while composing, and a very few think that the work is the work of more than one writer. But as we have intimated, the weight of testimony is in favour of St Luke's authorship.

*Purpose.*—We have seen that the Acts of the Apostles is the work of one author possessed of no inconsiderable skill. This author evidently omits many things that he knew; he gives a short account of others of which he could have supplied accurate details, and, as in the case of St Paul, he has brought forward one side of the character prominently, and thrown the other into the shade. What motive could have led him to act thus? What object had he in inserting what he has inserted, and omitting what he has omitted? Most of the answers given to these questions have no important bearing on the question of the authorship of the Acts. But the case is different with the answer of the Tübingen school. The Tübingen school maintains that St Paul taught that the law was of no avail to Jew and Gentile, and that, therefore, the observance of it was unnecessary; that St Peter and the other apostles taught that the observance of the law was necessary, and that they separated from St Paul on this point; and that the early Christians were divided into two great classes—those who held with St Paul, or the Gentile Christians, and those who held with St Peter, or the Jewish Christians. They further maintain that there prevailed a violent controversy between these two parties in the church, until a fusion took place towards the middle of the second half of the second century, and the Catholic Church arose. At what stage of this controversy was the Acts written? is the question they put. St Peter, we have seen, is represented in the Acts as opening the church to the Gentiles. St Peter and the rest of the apostles at Jerusalem admit the Gentiles on certain gentle conditions of refraining from things offered to idols, from animals suffocated, from blood, and from fornication. What could be the object of such statements but to convince the Jewish Christians that they were wrong in pertinaciously adhering to their entire exclusion of the Gentiles, or insisting on their observance of the entire law? But St Paul is represented as observing the law, as sent forth by St Peter and the other apostles, as going continually to the Jews first, and as appearing in the temple and coming up with collections for the Jerusalem church. Was not this also intended to reconcile the Jewish Christians to St Paul? Then the great doctrines of St Paul all but vanish—free grace, justification by faith alone, redemption through the blood of Christ,—all that is characteristic of St Paul disappears, except his universalism, and that is modified by the decree of the apostles, the circumcision of Timothy, and St Paul's observance of the law. The object of all this, they affirm, must be to reconcile the Jewish party by concessions. But there is said to be also another object, of minor importance indeed, but still quite evident and falling in with the other. Throughout the Acts St Paul is often accused of turning the world upside down and causing disturbances. The Jewish Christians may have thought that St Paul was to

blame in this matter, and that St Paul's opinions were peculiarly calculated to stir up persecution against the Christians. The stories in the Acts were devised to convince them that they were mistaken in this supposition. On every occasion in which St Paul is accused before magistrates, and especially Roman magistrates, he is acquitted. Gallio, the town-clerk of Ephesus, Lysias, Felix, and Festus, all declare that St Paul has done nothing contrary to the law. And while the Romans thus free him from all blame, it is the Jews who are always accusing him.

We have here reproduced the argument of Zeller, who has given the most thorough exposition of an opinion held also by Baur, Schwegler, and others. The argument fails to have effect if the assumption that St Paul and St Peter differed radically is rejected. It also suffers from the circumstance, that there is no historical authentication of the church being in such a state in the first half of the second century, that this attempt at reconciliation could take place within it. Moreover, the writing of a fictitious production seems an extraordinary means for any one to employ in order to effect reconciliation, especially if, as Zeller imagines, the church in Rome was specially contemplated. The church in Rome and the other Christian churches had St Paul's Epistles to the Romans, Corinthians, and Galatians before them. They could be in no doubt as to what were his sentiments. They must also have had some history of his career; and no object could be effected by attempting to palm upon them a decree of apostles which never existed, or a history of St Peter and St Paul contradicted by what they knew of both.

Overbeck, finding this solution of Zeller unsatisfactory, thinks that the object of the Acts is to help the Gentile-Christian Church of the first half of the second century, now removed from Paulinism and strongly influenced by Judaism, to form a clear idea of its own past, especially of its own origin and of its founder St Paul. It is thus, he maintains, an historical novel, somewhat like the *Clementines*, devised to realise the state of the church at an earlier period.

It would be tedious to enumerate all the other objects which have been set forth as the special aim of the Acts. Some think that it was a work written for the private use of Theophilus, and aimed, therefore, at giving him the special information which he required. Others think that it is intended to describe the spread of the gospel from Jerusalem to Rome. Others believe that the writer wished to defend the character of the Apostle Paul. Some of the more recent members of the Tübingen school think that it was intended to distort the character of St Paul, and that the image of him given in the Acts is an intermediate stage between the real Paul and the caricature supposed by them to be made of him under the name of Simon in the *Clementines*.

*Date.*—There are no sure data for determining the date. Appeal used to be made to Acts vii. 26, "Unto the way which goeth down from Jerusalem to Gaza, which is desert." But most probably it is the way which is here said to be desert or lonely. But even if the word "desert" or "lonely" be applied to Gaza, we get nothing out of it. Accordingly, in the absence of data very various dates have been assigned. Some think that it was written at the time mentioned in the last chapter of Acts, when St Paul had been two years in Rome. Some think that it must have been written after the fall of Jerusalem, as they believe that the gospel was written after that event. Irenæus thought that it was written after the death of St Peter and St Paul (*H. iii. 1*). Others think that St Luke must have written it at a late period of his life, about the year 80 A.D. The Tübingen school think that it was written some time in the second century, most of them agree-

ing on the second or third decade of that century, about 125 A.D. They argue that a late date is proved by the nature of the purpose which occasioned the work, by the representation which it gives of the relation of the Christians to the Roman state, and by the traces of Gnosticism (*xx. 29*), and of a hierarchical constitution of the church (*i. 17, 20; viii. 14, ff.; xv. 28; xx. 17, 28*) to be found in the Acts.

*Place.*—There is no satisfactory evidence by which to settle the place of composition. Later fathers of the church and the subscriptions of late MSS. mention Achaia, Attica, Alexandria, Macedonia, and Rome. And these places have all had their supporters in modern times. Some have also tried to show that it was written in Asia Minor, probably at Ephesus. The most likely supposition is that it was written at Rome; Zeller has argued with great plausibility for this conclusion.

There is a large literature on the subject of this article, but the most important treatises are those of Schwanbeck, Schneckenburger, Lekebusch, Zeller, Trip, Klostermann, and Ertel. Zeller's work deserves special praise for its thoroughness. Various other writers have discussed the subject in works dealing with this among others; as Baur in his *Paulus*; Schwegler in his *Nachapostolisches Zeitalter*; Ewald in his *History of Israel*; Renan in his *Apostles*; Hausrath in his *New Testament History*; and, in a more conservative manner, Neander, Baumgarten, Lechler, Thiersch, and Lange. Of commentaries, the best on the Tübingen side is that of De Wette, remodelled by Overbeck, and that of the more conservative Meyer is especially good. In English we have an able treatment of the subject in Dr Davidson's *Introduction to the Study of the New Testament*; we have commentaries by Biscoe, Humphry, Hackett, Cook, Wordsworth, Alford, and Gloag; and dissertations by Paley, Birks, Lewin, Conybeare, and Howson.

There are various other treatises claiming to be Acts of Apostles. One or two of these must have existed at an early date, though, no doubt, they have since received large interpolations. But most of them belong to a late period, and all of them are acknowledged to be apocryphal. They are edited by Tischendorf in his *Acta Apostolorum Apocrypha* (Lipsie, 1851), and have been translated, with an introduction giving information as to their origin and dates, by Mr Walker, in vol. xvi. of the *Ante-Nicene Library*. (s. d.)

ACTA CONSISTORII, the edicts of the consistory or council of state of the Roman emperors. These edicts were generally expressed in such terms as these: "The august emperors, *Dioctletian* and *Maximian*, in council declare, That the children of decurions shall not be exposed to wild beasts in the amphitheatre."—The senate and soldiers often swore, either through flattery or on compulsion, upon the edicts of the emperor. The name of a senator was erased by Nero out of the register, because he refused to swear upon the edicts of Augustus.

ACTA DIURNA, called also *Acta Populi*, *Acta Publica*, and simply *Acta* or *Diurna*, was a sort of Roman gazette, containing an authorised narrative of the transactions worthy of notice which happened at Rome—as assemblies, edicts of the magistrates, trials, executions, buildings, births, marriages, deaths, accidents, prodigies, &c. Petronius has given us an imitation specimen of the *Acta Diurna*, one of two extracts from which may be made to show their style and contents. The book-keeper of Trimalchio pretends to read from the *Acta Urbis*:—"On the 30th of July, on the Cuman farm, belonging to Trimalchio, were born 30 boys and 40 girls; there were brought into the barn from the threshing-floor 125,000 bushels of wheat; 500 oxen were broken in.—On the same day the slave Mithridates was crucified for having slandered the tutelary deity of our



friend Gaius.—On the same day 100,000 sesterces, that could not be invested, were put into the money-box.—On the same day a fire broke out in the gardens of Pompey, which arose in the steward's house," &c. The *Acta* differed from the *Annals* (which were discontinued in B.C. 133) in this respect, among others, that only the greater and more important matters were given in the latter, while in the former things of less note also were recorded. The origin of the *Acta* is attributed to Julius Cæsar, who first ordered the keeping and publishing of the acts of the people by public officers. Some trace them back as far as Servius Tullius, who it was believed ordered that the next of kin, on occasion of a birth, should register the event in the temple of Venus, and on occasion of a death, should register it in the temple of Libitina. The *Acta* were drawn up from day to day, and exposed in a public place to be read or copied by all who chose to do so. After remaining there for a reasonable time they were taken down and preserved with other public documents.

ACTA SENATUS, among the Romans, were minutes of the discussions and decisions of the senate. These were also called *Commentarii Senatus*, and, by a Greek name, *ἱστορίαι*. Before the consulship of Julius Cæsar, minutes of the proceedings of the senate were written and occasionally published, but unofficially. Cæsar first ordered the minutes to be recorded and published authoritatively. The keeping of them was continued by Augustus, but the publication was forbidden. Some prominent senator was usually chosen to draw up these *Acta*.

ACTÆON, in *Fabulous History*, son of Aristæus and Autonoe, a famous hunter. He was torn to pieces by his own dogs. Various accounts are given of this occurrence; but the best known story is that told by Ovid, who represents him as accidentally seeing Diana as she was bathing, when she changed him into a stag, and he was pursued and killed by his dogs.

ACTIAN GAMES, in *Roman Antiquity*, solemn games instituted by Augustus, in memory of his victory over Antony at Actium. See ACTIUM.

ACTINIA, a genus of cœlentrate animals, of which the sea-anemone is the type. See ACTINOZOA.

ACTINISM (from *ἀκτίς*, a ray), that property of the solar rays whereby they produce chemical effects, as in photography. The actinic force is greatest in the blue and violet rays of the spectrum.

ACTINOMETER (*measurer of solar rays*), a thermometer with a large bulb, filled with a dark-blue fluid, and enclosed in a box, the sides of which are blackened, and the whole covered with a thick plate of glass. It was the invention of the late Sir John Herschel, and was first described in the *Edinburgh Journal of Science* for 1825. It is used for measuring the heating power of the sun's rays, the amount of which is ascertained by exposing the bulb for equal intervals of time in sunshine and shade alternately.

ACTINOZOA, a group of animals, of which the most familiar examples are the sea-anemones and "coral insects" of the older writers. The term was first employed by de Blainville, to denote a division of the Animal Kingdom having somewhat different limits from that to which its application is restricted in the present article; in which it is applied to one of the two great divisions of the Cœlentērata, the other being the *Hydrozoa*.

The *Actinozoa* agree with the *Hydrozoa* in the primitive and fundamental constitution of the body of two membranes, an *ectoderm* and an *endoderm*,—between which a middle layer or *mesoderm* may subsequently arise,—in the absence of a completely differentiated alimentary canal, and in possessing thread cells, or nematocytes; but they present a somewhat greater complexity of structure.

This is manifest, in the first place, in their visceral tube, or "stomach," as it is often called, which is continued from the margins of the mouth, for a certain distance, into the interior cavity of the body, but which is always open at its fundus into that cavity. And, secondly, in the position of the reproductive elements, which, in the *Hydrozoa*, are always developed in parts of the body wall which are in immediate relation with the external surface, and generally form outward projections; while, in the *Actinozoa*, they are as constantly situated in the lateral walls of the chambers into which the body cavity is divided. In consequence of this arrangement, the ova, or sexually generated embryos, of the *Actinozoa* are detached into the interior of the body, and usually escape from it by the oral aperture; while those of the *Hydrozoa* are at once set free on the exterior surface of that part of the body in which they are formed.

The *Actinozoa* comprise two groups, which are very different in general appearance and habit, though really similar in fundamental structure. These are—

1. The *Coralligena* or sea-anemones, coral animals, and sea-pens; and 2. The *Ctenophora*.

(1.) The *Coralligena*.—A common sea-anemone presents a subcylindrical body, terminated at each end by a disk. The one of these discoidal ends serves to attach the ordinarily sedentary animal; the other exhibits in the centre a mouth, which is usually elongated in one direction, and, at each end, presents folds extending down into the gastric cavity. This circumstance greatly diminishes the otherwise generally radial symmetry of the disk, and of the series of flexible conical tentacles which start from it; and, taken together with some other circumstances, raises a doubt whether even these animals are not rather bilaterally, than radially, symmetrical. Each tentacle is hollow, and its base communicates with one of the chambers into which the cavity of the body is divided, by thin membranous lamellæ, the so-called mesenteries, which radiate from the oral disk and the lateral walls of the body to the parietes of the visceral tube. The inferior edges of the mesenteries are free, and arcuated in such a manner as to leave a central common chamber, into the circumference of which all the intermesenteric spaces open, while above, it communicates with the visceral tube. The tentacles may be perforated at their extremities, and, in some cases, the body wall itself exhibits apertures leading into the intermesenteric spaces. The free edges of the mesenteries present thickenings, like the hem of a piece of linen, each of which is much longer than the distance between the gastric and the parietal attachment of the mesentery, and hence is much folded on itself. It is full of thread cells. The mesoderm, or middle layer of the body, which lies between the ectoderm and the endoderm, consists of a fibrillated connective tissue, containing fusiform or stellate nucleated cells, and possesses longitudinal and circular muscular fibres. These are prolonged into the mesenteries, and attain a great development in the disk of attachment, which serves as a sort of foot like that of a limpet.

The question whether the *Coralligena* possess a nervous system and organs of sense, hardly admits of a definite answer at present. It is only in the *Actinida* that the existence of such organs has been asserted; and the nervous circlet of *Actinia*, described by Spix, has been seen by no later investigator, and may be safely assumed to be non-existent. But Professor F. M. Duncan, F.R.S., in a paper "On the Nervous System of *Actinia*," recently communicated to the Royal Society, has affirmed the existence of a nervous apparatus, consisting of fusiform ganglionic cells, united by nerve fibres, which resemble the sympathetic nerve fibrils of the *Vertebrata*, and form a plexus, which appears to extend throughout the pedal disk, and very probably into other parts of the body. In some of

the *Actinidæ* (e.g., *Actinia mesembryanthemum*), brightly coloured bead-like bodies are situated on the oral disk outside the tentacles. The structure of these "chromatophores," or "bourses calcinales," has been carefully investigated by Schneider and Röttelkem, and by Professor Duncan. They are diverticula of the body wall, the surface of which is composed of close-set "bacilli," beneath which lies a layer of strongly-refracting spherules, followed by another layer of no less strongly refracting cones. Subjacent to these Professor Duncan finds ganglion cells and nerve plexuses. It would seem, therefore, that these bodies are rudimentary eyes.

At the breeding season the ova or spermatozoa are evolved in the thickness of the mesenteries, and are discharged into the intermesenteric spaces, the ova undergoing their development within the body of the parent. The yolk, usually, if not always, enclosed in a vitelline membrane, undergoes complete division, and the outer wall of the ciliated blastodermic mass which results becomes invaginated, the embryo being thereby converted into a double walled sac—the external aperture of which is the future mouth, while the contained cavity represents the body cavity. In this stage the larval *Actinia* represents the *Gastrula* condition of sponges and *Hydrozoa*. The edges of the oral aperture grow inwards, giving rise to a circular fold, which is the rudiment of the visceral tube. This is at first connected with the body wall by only two mesenteries, which are seated at opposite ends of one of the transverse diameters of the body. As the mesenteries increase in number, the tentacles grow out as diverticula of the intermesenteric spaces. In all the *Coralligena*, the development of which has been observed, the embryo is converted into a simple actinozoon in a similar manner; but from this point they diverge in two directions. In one great group, the mesenteries, and the tentacles which arise from the intermesenteric chambers, increase in number to six; and then, in the great majority of cases, the intermesenteric spaces undergo subdivision by the development of new mesenteries, according to curious and somewhat complicated numerical laws, until their number is increased to some multiple of five or six. In these *Hexacoralla* (as they have been termed by Haeckel) the tentacles also usually remain rounded and conical. In the other group, the *Octocoralla*, the mesenteries and the tentacles increase to eight, but do not surpass that number; and the tentacles become flattened and serrated at the edges, or take on a more or less pennatifid character.

There are no *Octocoralla* which retain the simple individuality of the young actinozoon throughout life; but all increase by gemmation, and give rise to compound organisms, which may be arborescent, and fixed by the root end of the common stem, as in the *Alicyonidæ* and *Gorgonidæ*; or may possess a central stem which is not fixed, and gives off lateral branches which undergo comparatively little subdivision, as in the *Pennatulidæ*.

The body cavities of the zooids of these compound *Octocoralla* are in free communication with a set of canals which ramify through the *cenosarc*, or common fabric of the stem and branches by which they are borne, and which play the part of a vascular system.

Except in the case of *Tubipora*, the zooids and the superficial *cenosarc* give rise to no continuous skeleton; but the deep or inner substance of the *cenosarc* may be converted into a solid rod-like or branching stem.

In the *Hexacoralla*, on the other hand, one large group, that of the *Actinidæ*, consists entirely of simple organisms,—organisms that is, in which the primitive actinozoon attains its adult condition without budding or fission; or if it bud or divide, the products of the operation separate from one another. No true skeleton is formed,

all are to some extent locomotive, and some (*Minyas*) float freely by the help of their contractile pedal region. The most remarkable form of this group is the genus *Cereanthus*, which has two circlets, each composed of numerous tentacles, one immediately around the oral aperture, the other at the margin of the disk. The foot is elongated, subconical, and generally presents a pore at its apex. Of the diametral folds of the oral aperture, one pair is much longer than the other, and is produced as far as the pedal pore. The larva is curiously like a young hydrozoon with free tentacles, and at first possesses four mesenteries, whence it may be doubted whether *Cereanthus* does not rather belong to the *Octocoralla*.

The *Zoanthidæ* differ from the *Actinidæ* in little more than their multiplication by buds, which remain adherent, either by a common connecting mass or *cenosarc* or by stolons; and in the possession of a rudimentary, spicular skeleton.

On the other hand, the proper stone-corals (as contrasted with the red coral) are essentially *Actinidæ*, which become converted into compound organisms by gemmation or fission, and develop a continuous skeleton.

The skeletal parts<sup>1</sup> of the *Actinosoa*, to which reference has been made, consist either of a substance of a horny character; or of an organic basis impregnated with earthy salts (chiefly of lime and magnesia), but which can be isolated by the action of dilute acids; or finally, of calcareous salts in an almost crystalline state, forming rods or corpuscles, which, when treated with acids, leave only an inappreciable and structureless film of organic matter. The hard parts of all the *Aporosa*, *Perforata*, and *Tabulata* of Milne Edwards are in the last-mentioned condition; while, in the *Octocoralla* (except *Tubipora*) the *Antipathidæ*, and *Zoanthidæ*, the skeleton is either horny, or consists, at any rate, to begin with, of definitely formed spicula, which contain an organic basis, and frequently present a laminated structure. In the organ coral (*Tubipora*), however, the skeleton has the character of that of the ordinary stone-corals, except that it is perforated by numerous minute canals.

The skeleton appears, in all cases, to be deposited within the mesoderm, and in the intercellular substance of that layer of the body. Even the definitely shaped spicula of the *Octocoralla* are not the result of the metamorphosis of cells. In the simple *aporosa* corals the calcification of the base and side walls of the body gives rise to the cup or *theca*; from this the calcification radiates inwards, in correspondence with the mesenteries, and gives rise to as many vertical *septa*, the spaces between which are termed *loculi*; while, in the centre, either by union of the *septa* or independently, a pillar, the *columnella*, grows up. From the sides of adjacent *septa* scattered processes of calcified substance, or *synapticalæ*, may grow out toward one another, as in the *Fungidæ*; or the interruption of the cavities of the *loculi* may be more complete by the formation of shelves stretching from septum to septum, but lying at different heights in adjacent *loculi*. These are *interseptal dissepiments*. Finally, in the *Tabulata*, horizontal plates, which stretch completely across the cavity of the *theca*, are formed one above the other and constitute *tabular dissepiments*.

In the *Aporosa* the *theca* and *septa* are almost invariably imperforate; but in the *Perforata* they present apertures, and in some madreporæ the whole skeleton is reduced to a mere network of dense calcareous substance. When the *Hexacoralla* multiply by gemmation or fission, and thus give rise to compound massive or arborescent aggregations, each newly-formed coral polype develops a skeleton

<sup>1</sup> See Kölliker's *Icones Histologicae*, 1868.



of its own, which is either confluent with that of the others, or is united with them by calcification of the connecting substance of the common body. This intermediate skeletal layer is then termed *coenenchyma*.

The *Octocoralla* (excepting *Tubipora*) give rise to no *thecae* and their dependencies, the skeleton of each polype, and of the superficial portion of the polyparium, being always composed of loose and independent spicula. But in many, as the *Gorgonidae*, *Pennatulidae* (and in the *Antipathidae* among the *Hexacoralla*), the central part of the common stem of the compound organism becomes hardened, either by conversion into a mere horny axis (which may be more or less impregnated with calcareous salts) without spicula; or the cornification may be accompanied by a massive development of spicula, either continuously or at intervals; or the main feature of the skeleton may, from the first, be the development of spicula, which become soldered together by a subcrystalline intermediate deposit, as in the red coral of commerce (*Corallium rubrum*).

It has seemed advisable to say thus much concerning the hard parts of the *Actinozoa* in this place, but the details of the structure and development of the skeleton of the *Coralligena* will be discussed under CORALS and CORAL REEFS.

The *Tabulata*, or Millepores, and the *Rugosa*, an extinct and almost exclusively Paleozoic group of stone-coral forming animals, are usually referred to the *Coralligena*. Judging by the figures given by Agassiz<sup>1</sup> of living Millepores, the polypes which cover its surface are undoubtedly much more similar to coryniform *Hydrozoa* than they are to any *Actinozoan*. But it is to be observed, firstly, that we have no sufficient knowledge of the intimate structure of the polypes thus figured; and, secondly, that the figures show not the least indication of the external reproductive organs which are so conspicuous in the *Hydrozoa*, and which surely must have been present in some one or other of the Millepores examined, were they really *Hydrozoa*. As regards the *Rugosa*, the presence of septa is a strong argument against their belonging to any group but the *Actinozoa*, though it is not to be forgotten that a tendency to the development of septiform prominence is visible in the walls of the gastric passages of certain calcareous sponges.

Phenomena analogous to the "alternation of generations," which is so common among the *Hydrozoa*, are unknown among the great majority of the *Actinozoa*. But Semper<sup>2</sup> has recently described a process of sexual multiplication in two species of *Fungia*, which he ranks under this head. The *Fungia* bud out from a branched stem, and then become detached and free, as is the habit of the genus. To make the parallel with the production of a *Medusa* from a *Scyphistoma* complete, however, the stem should be nourished by an asexual polype of a different character from the forms of *Fungia* which are produced by gemmation. And this does not appear to be the case.

Dimorphism has been observed by Kölliker to occur extensively among the *Pennatulidae*. Each polypary presents at least two different sets of zooids, some being fully developed, and provided with sexual organs, while the others have neither tentacles nor generative organs, and exhibit some other peculiarities.<sup>3</sup> These abortive zooids are either scattered irregularly among the others (e.g., *Sarcophyton*, *Veretillum*), or may occupy a definite position (e.g., *Virgularia*).

(2.) The *Ctenophora*.—These are all freely swimming,

actively locomotive, marine animals, which do not multiply by gemmation, nor form compound organisms such as the polyparies of the *Coralligena*. Like the latter they are composed of a cellular ectoderm and endoderm, between which a mesoderm, containing stellate connective tissue corpuscles and muscular fibres, is interposed. But, in most parts of the organism, the mesoderm acquires a great thickness and a gelatinous consistency; so that the body of one of these animals differs in this respect from that of an *Actinia* in the same way as the body of a *Cyanea* differs from that of a *Hydra*. The bilateral symmetry, which is obscure in most of the *Coralligena*, becomes obvious in the *Ctenophora*, in which the parts are disposed symmetrically on each side of a vertical plane passing through the longitudinal axis of the body. The oral aperture is situated at one end of this axis (or its oral pole), while at the opposite extremity (or aboral pole) there is very generally situated a sac containing solid mineral particles—the *lithocyst*.

The oral aperture leads into a visceral tube, which undoubtedly performs the functions of a stomach. Nevertheless, as in the *Coralligena*, it is open at its aboral end, and its cavity is thus placed in direct communication with a chamber, whence canals are given off which penetrate the gelatinous mesoderm. Of these canals, one continues the direction of the axis of the body, and usually ends by two apertures at the aboral pole. The others take a direction in a plane more or less at right angles with the axis; and after branching out, terminate in longitudinal canals, which lie beneath the series of locomotive paddles, or come into relation with the tentacles when such organs are developed. In addition to these, two canals frequently extend along the sides of the stomach towards the oral pole. The paddle-like locomotive plates are disposed in eight longitudinal series (*ctenophores*) on the outer surface of the body. They are thick at the base; thin and, as it were, frayed out into separate filaments, at their free edges; and each plate is set transversely to the long axis of the series of which it forms a part. The ovaria and testes are developed in the side walls of the longitudinal canals. It is clear, therefore, that these canals answer to the intermesenteric spaces of an *Actinia*; that the common cavity into which they and the stomach open answers to the common cavity of the body of the *Actinia*; that the apertures at the aboral pole answer to the terminal aperture of *Ceranthus*; and that the wide interspaces between the longitudinal canals represent the mesoderm of the Actinian mesenteries immensely thickened.

In their development the *Ctenophora* resemble the *Coralligena* in all essential respects, though they differ from them in some details. Thus the process of yolk division goes on at a different rate in the two moieties of the egg, so that the vitellus becomes divided into one set of small and another set of large cells, whereof the latter become overlaid by the former, and give rise to a large-celled hypoblast, enclosed within a small-celled epiblast. But in the manner in which the body cavity is formed, and the visceral tube (which becomes the stomach) is developed, the *Ctenophora* resemble the *Actinia*. The paddles make their appearance at four points of the circumference of the body, in the form of elevations beset with short cilia; but each of these divides into two, and thus the eight definitive series are constituted.

There is a general agreement among anatomists respecting the structure of the *Ctenophora* thus far; but the question whether they possess a nervous system and sensory organs or not, is, as in the case of the *Coralligena*, one upon which there exists great diversity of opinion. Grant originally described a nervous ganglionated ring, whence longitudinal cords proceed in *Cydippe* (*Pluteobranchia*);

<sup>1</sup> Contributions to the Natural History of the United States. Vol. III. Plate xv.

<sup>2</sup> Ueber Generations-Wechsel bei Steinkorallen. Leipzig, 1872.

<sup>3</sup> Abhandlungen der Senkenbergischen Naturforschenden Gesellschaft, Bd. VII. VIII.

but his observation has not been verified by subsequent investigations. According to Milne Edwards, followed by others (among whom I must include myself), the nervous system consists of a ganglion, situated at the aboral pole of the body, whence nerves radiate, the most conspicuous of which are eight cords which run down the corresponding series of paddles; and a sensory organ, having the characters of an otolithic sac, is seated upon the ganglion. Agassiz and Kölliker, on the other hand, have denied that the appearances described (though they really exist) are justly interpreted. And again, though the body, described as an otolithic sac, undoubtedly exists in the position indicated in all, or most, of the *Ctenophora*, the question has been raised whether it is an auditory or a visual organ.

These problems have been recently reinvestigated with great care, and, by the aid of the refined methods of modern histology, by Dr Eimer,<sup>1</sup> who describes a nervous system, consisting of extremely delicate varicose ultimate nerve fibrils, which traverse the mesoderm in all directions, and are connected here and there with ganglionic corpuscles. These nerves are only discernible with high magnifying powers, as they are for the most part isolated, and are collected into bundles only beneath the longitudinal canals. The mass which lies beneath the lithocyst is composed of cells, but these have none of the special characters of nerve cells. Eimer states that he has traced the filaments, which he considers to be nerves, into direct continuity with muscular fibres; and, around the mouth, into subepidermal bodies, which he regards as rudimentary forms of tactile corpuscles. The lithocyst is recognised as an auditory organ, and, in addition, eye-spots are described.

With a fundamental similarity of organisation, the form of the body varies extraordinarily in the *Ctenophora*. One of the genera which is commonest on our coasts—*Cydyippe* (*Pleobrachia*)—is spheroidal; others (*Beroë*) are more ovate; others are provided with large lobular processes (*Eucharis*), while an extreme modification, in which the body is ribbon shaped, is seen in *Cestum*.

The *Ctenophora* are divisible into two very unequal groups:<sup>2</sup>

- I. *Eurytomata*, in which the large oral aperture occupies the truncated extremity of the oval body.
1. *Beroïdæ*.
- II. *Stenotomata*, in which the oral aperture and the gastric sac are small relatively to the size of the body.

2. *Saccatæ*.
3. *Lobatæ*.
4. *Tentatæ*.

#### 1. *Beroïdæ*.

The body is ovate, truncated at the oral pole, the aboral being more or less acuminate and mobile. The digestive cavity occupies a large portion of the body. The oral margin is simple in *Beroë* and *Idyia*; but in *Rangia* the interradial spaces are notched, and in each a short process projects. The radial canals are connected by a circumoral canal. No tentacles are present. The ctenophores of *Pandora* do not extend over more than half the body, as in the embryos of *Cydyippe*. The development of the *Beroïdæ* is unaccompanied by metamorphosis.

#### 2. *Saccatæ*.

The circumoral canal is absent. The oral aperture is laterally compressed, its long axis being at right angles to the plane of the tentacles, which are present in all the genera, and which are either simple (*Cydyippe*), or furnished with lamellar and filamentous appendages (*Hormiphora*). The ctenophores are equal in length, or the lateral ones are fully developed, while the intermediate are shorter.

#### 3. *Lobatæ*.

The oral and aboral pole, or the oral only, bear lobate appendages. *Bolindæ* has a pair of oral lappets, into which the radial canals are prolonged. The ctenophores corresponding to these lobes are the longest, while the middle ones are much shorter, and are prolonged on to an auricle or finger-like lobe. The tentacles are represented by a tuft of short processes on either side of the mouth. The young *Bolindæ* has the form of *Cydyippe*, and like it bears a pair of long-fringed

tentacles. The aboral region, bearing the lateral ctenophores, grows more rapidly than the oral, so as ultimately to project in two principal lobes, by which the similar outgrowth of the median aboral regions with its ctenophores is arrested, the auricles being the dwarfed representatives of these regions. These auricles in *Eucharis* are longer, so that the ctenophores are all of equal length. The tentacles of this genus are placed at the oral pole; the oral lobes are equivalent to the median ctenophores of *Cydyippe*. *Eurhamphæa* has the oral lobes small, the body elongated, terminated by two conical projections, on which the median ctenophores are prolonged.

#### 4. *Tentatæ*.

The body of *Cestum* is laterally compressed and elongated in a direction which corresponds to one of the transverse diameters of *Cydyippe*, the ribbon-like band thus formed being sometimes three or even four feet long. The tentacles are near the oral pole; the canals are ten in number; the medio-lateral canals terminate in trunks which follow the oral margin of the ribbon, and thus correspond to the circular canal of *Beroë*.

Many *Actinozoa* (*Pennatulidæ*, *Ctenophora*) are phosphorescent; but the conditions which determine the evolution of light have not been determined.

All *Actinozoa* are marine animals, and the distribution of many of the families (*Actinidæ*, *Turbinolidæ*, *Pennatulidæ*, *Beroïdæ*) is extremely wide, and bears no ascertainable relation to climate. (T. H. H.)

**ACTION**, in *Law*, is the process by which redress is sought in a court of justice for the violation of a legal right. The word is used by jurists in three different senses. Sometimes it is spoken of as a right—the right, namely, of instituting the legal process; sometimes, and more properly, it means the legal process itself; and sometimes the particular form which it assumes. The most universally recognised division of actions is the division established by the Roman lawyers into actions *in rem* and *in personam*. An action *in rem* asserts a right to a particular thing as against all the world; an action *in personam* asserts a right only as against a particular person. For the sake of convenience, the law relating to actions ought to form a separate section by itself in a properly constructed code.

In Roman law the action passed through three historical stages—

In the first period, which was brought to an end by the *Lex Æbutia*, about 573 A.D., the system of *legis actiones* prevailed. These were five in number,—the *actio sacramenti*, *per judicis postulationem*, *per condictionem*, *per manus injectionem*, *per pignoris captionem*. The first was the primitive and characteristic action of the Roman law, and the others were little more than modes of applying it to cases not contemplated in the original form, or of carrying the result of it into execution when the action had been decided.

**ACTION**, in *English Law*, means the form of civil process hitherto observed in the Courts of Common Law. The procedure in the Court of Chancery is totally distinct, but some account of the former may be desirable in order to explain the new form of action introduced for all the civil courts by the Judicature Act of 1873:—

Actions at law are divided by Blackstone into three classes, according to the relief which they are respectively intended to obtain. *Real actions* are those "whereby the plaintiff claims title to have any lands or tenements, rents, commons, or other hereditaments." In *personal actions* the claim is "for debt or personal duty, or damages in lieu thereof," or for "satisfaction in damages for some injury done to person or property." *Mixed actions* were supposed to partake of the nature of both of these; that is to say, there was a demand both for real property and for personal damages, as in the case of an action for waste. The distinction has long ceased to be of any value. Blackstone speaks of real actions as being in his time pretty generally laid aside, and successive enactments have obliterated the distinctions altogether. The statute 3 & 4 Will. IV. c. 27, abolished all the real and mixed actions, except three real actions, and ejectment, which was a mixed action. The Common Law Procedure Act of 1860 has assimilated the procedure in the former to an ordinary action, and the Common Law Procedure Act of 1852 now regulates the proceedings in ejectment. In these and other respects the three Common Law Procedure Acts of 1852, 1854, and 1860, very greatly simplified the proceedings in an action at law. The first of these rendered it unnecessary any longer to select a *form* of action in prosecuting a claim, and abolished many of the technicalities which had accompanied the older forms. The divi-

<sup>1</sup> *Zoologische Studien auf Capri*. 1873.

<sup>2</sup> Haeckel, "*Generelle Morphologie*," II. Ixi.)



tions now observed may be regarded as indicating, not so much forms of action in the old sense, as the character of the injury sustained and the relief sought.

**ACTION** (under the Supreme Court of Judicature Act, 1873). By this Act, which establishes one supreme court in place of the Superior Courts of Common Law and the High Court of Chancery, action is the name given to the proceeding in the High Court of Justice, which takes the place of the old actions at common law, suits instituted by bill or information in the Court of Chancery, causes *in rem* in the Court of Admiralty, or by citation in the Court of Probate. For these various modes of obtaining redress the Act substitutes one uniform proceeding, which retains most of the essential features of the common law action. The form of action established by the Act is in some measure a compromise between the old action at law and Chancery suit. It may be described as putting an end to the unintelligible and even misleading formulae of the one and reducing the prolixity and redundancy of the other. (E. R.)

**ACTIUM**, in *Ancient Geography*, a promontory in the north of Acarnania, at the mouth of the Sinus Ambracius, opposite the town of Nicopolis, built by Augustus on the north side of the strait. Eastwards from the promontory the strait widens out and forms a safe harbour. On the promontory was an ancient temple of Apollo (who is hence called by Virgil *Activus*), which was enlarged by Augustus. Actium became famous on account of Augustus's victory over Antony and Cleopatra (B.C. 31), and for the quinquennial games he instituted there, called *Actia* or *Ludi Actiaci*. *Actiaca Æra* was a computation of time from the battle of Actium. There was on the promontory a small town, or rather village, also called *Actium*.

**ACTON**, a large village in Middlesex, about eight miles west of St Paul's. It was once much frequented because of its saline springs, but these have long lost their repute. Acton being near the metropolis and easily accessible by the Great Western Railway, and the price of building land being low, numerous villas have been erected in the neighbourhood. The population of the parish increased from 3151 in 1861 to 8306 in 1871.

**ACTON, SIR JOHN FRANCIS EDWARD**, son of Edward Acton, who practised as a physician at Besançon, was born there in 1736, and succeeded to the title and estates in 1791, on the death of his cousin in the third degree, Sir Richard Acton. He served in the navy of France, and afterwards in that of Tuscany, and commanded a frigate in the joint expedition of Spain and Tuscany against Algiers in 1774. His gallantry in rescuing three or four thousand Spanish soldiers from slavery led to his advancement. Entering the Neapolitan service, he gained the favour of Queen Mary Caroline, became commander-in-chief of the land and sea forces, then minister of finance, and ultimately prime minister. His policy was devised in concert with the English ambassador Hamilton, and, of course, was hostile to France and to the French party in Italy. He has been held responsible for the arbitrary and despotic measures which, in 1798-99, filled the prisons of Naples with political prisoners, and even brought some of them to the scaffold. In 1803 Acton was for a short time deprived of the reins of government at the demand of France, but he was speedily restored to his former position, which he held till, in Feb. 1806, on the entry of the French into Naples, he had to flee with the royal family into Sicily. He died at Palermo on the 12th Aug. 1811, leaving by his wife (eldest daughter of his brother, General Joseph Edward Acton, whom he had married by papal dispensation) three children, of whom the second, Charles Januarius Edward, was made Cardinal Santa Maria della Pace in 1842. It may be well to state that Sir John has very frequently

been confounded with his above-mentioned brother, born in 1737, who was also employed in the Neapolitan service.

**ACTUARY**, in ancient Rome, was the name given to the clerks who recorded the *Acta Publica* of the Senate, and also to the officers who kept the military accounts and enforced the due fulfilment of contracts for military supplies. In its English usage the word has undergone a gradual limitation of meaning. At first it seems to have denoted any clerk or registrar; then more particularly the secretary and adviser of any joint-stock company, but especially of an insurance company; and it is now applied specifically to one who makes those calculations as to the probabilities of human life, on which the practice of life assurance and the valuation of reversionary interests, deferred annuities, &c., are based. The first mention of the word in law is in the Friendly Societies Act of 1819, where it is used in the vague sense, "actuaries, or persons skilled in calculation." The word has been used with precision since the establishment of the "Institute of Actuaries of Great Britain and Ireland" in 1848. The "Faculty of Actuaries in Scotland" was formed at Edinburgh in 1856, and incorporated by royal charter in 1868. The registrar in the Lower House of Convocation is also called the actuary.

**ACUÑA, CHRISTOVAL D'**, a Spanish Jesuit, born at Burgos in 1597. He was admitted into the society in 1612, and, after some years spent in study, was sent as a missionary to Chili and Peru, where he became rector of the College of Cuenca. In 1639 he was appointed by the Jesuits to accompany Pedro Texeira in his second exploration of the Amazon, in order to take scientific observations, and draw up a report that might be sent to Spain. The journey lasted for ten months; and, on their arrival at Peru, no ship being ready to convey the explorer to Spain, Acuña employed himself in the preparation of a narrative of his journey. This was published at Madrid in 1641, under the title *Nuevo Descubrimiento del Gran Río de las Amazonas, &c.* The King of Spain received Acuña coldly, and, it is said, even tried to suppress his book, fearing that the Portuguese, who had revolted from Spain, would avail themselves of the information which it contained. A translation into French was published by Gomberville in 1682; and a translation from the French into English appeared in 1698. After occupying the positions of procurator of the Jesuits at Rome, and *calificador* (censor) of the Inquisition at Madrid, Acuña returned to South America, where he died, probably soon after the year 1675.

**ACUPRESSURE**, in *Surgery* (*acus*, a needle, *premo*, I press), a method of restraining hæmorrhage, introduced in 1869 by the late Sir J. Y. Simpson. The closure of the vessel near the bleeding point is attained by the direct pressure of a metallic needle, either alone or assisted by a loop of wire. The advantages claimed by the originator of this method over the old silk ligature were, that the needles can be removed within forty-eight hours after introduction, allowing the wound to heal rapidly; and that, being metallic and non-porous, they do not cause irritation and suppuration like the silk ligature. The catgut ligature, which is rapidly absorbed, is gradually superseding both the silk ligature and the acupuncture needle. A volume entitled *Acupressure*, by Sir J. Y. Simpson, was published in 1864.

**ACUPUNCTURE**, the name of a surgical operation among the Chinese and Japanese, which is performed by pricking the part affected with a silver needle. They employ this operation in headaches, lethargies, convulsions, colics, &c.; and it has more lately been introduced into British practice for the cure of some forms of neuralgia.

**ADAFUDIA**, a large town of Western Africa, in the country of the Felattahs, in 13° 6' N. lat., 1° 3' E. long., about 400 miles S.E. of Timbuctoo. It is surrounded by a mud wall. The neighbouring country is rich and

fertile. The trade in native merchandise is said to be as great as that of Abomey, the capital of Dahomey; and there is also a considerable traffic in slaves. Population, about 24,000.

ADAL, a region in Eastern Africa, with a coast line extending, between 11° 30' and 15° 40' N. lat., from the Gulf of Tajurrah to the neighbourhood of Massowah. For about 300 miles it borders on the Red Sea, the coast of which is composed of coral rock. It stretches inland to the mountain terraces, to the west of which lie the Abyssinian table-lands of Shoa and Tigré, with a breadth near Massowah of only a few miles, but widening towards the south to 200 or 300 miles. The northern portion of this region, known as the Afar country, is traversed by two routes to Abyssinia—the one from Zulla near Massowah, and the other from Amphilla Bay. The former of these was selected for the British Abyssinian expedition of 1868, Annesley Bay being the place of debarkation and base of operations. There is a third route to Abyssinia through Adal, that from Tajurrah to Ankobar, the capital of Shoa, said to be preferred for trading purposes, as being less steep than the others. The river Hawash flows through the southern district of Adal in a N.E. direction, but is lost in Lakes Abbedad and Aussa. Near this river is Aussa, the chief town of the country. Volcanic rocks occur in various parts of this district; and two mountains, 4000 feet high, are mentioned, which have sent down streams of lava on all sides to the distance of 30 miles. The country contains two great salt plains or basins,—that of Asali in its northern portion, and Aussa in the south. The remarkable salt lake of Bahr Assal, near Tajurrah, is 570 feet below the level of the sea. The country as a whole is barren and uncultivated. A little barley is reared on the higher terraces, and some districts afford pasturage for domestic animals, large quantities of butter being annually sent to Massowah. In some parts of Adal the elephant is not uncommon. The salt of Asali and Aussa is a valuable article of commerce. There is no fixed government, the country being inhabited by various independent tribes, all speaking the Afar language and professing the Mahometan religion, and most of them of nomadic habits.

ADALBERT, SAINT, one of the founders of Christianity in Germany, known as the Apostle of the Prussians, was born of a noble family in Slavonia, about 955; was educated at the monastery of Magdeburg; and, in 983, was chosen Bishop of Prague. The restraints which he tried to impose on the newly-converted Bohemians by prohibiting polygamy, clerical incontinency, and similar sins, raised against him so strong a feeling of hatred, that he was forced, in 988, to retire to Rome, where he resided at the monasteries of Monte Basino and St. Alexis. In 993 he returned to his flock, in obedience to the command of the Pope. Finding little amendment, however, in their course of living, he soon afterwards went again to Rome, and obtained permission from the Pope to devote himself to missionary labours, which he carried on chiefly in North Germany and Poland. While preaching in Pomerania (997), he was thrust through the heart by a heathen priest.

ADALBERT, Archbishop of Bremen and Hamburg, born of the noble Saxon family of the Counts of Wettin, was one of the most remarkable ecclesiastics of the 11th century. Through the friendship of the emperor Henry III. he was elevated in 1043, when only about thirty years old, to the see of Bremen and Hamburg, which included the whole of Scandinavia, and he accompanied the monarch in his journey to Rome (1046). Here it is said that he was offered and that he refused the papal throne. The refusal certainly cannot have arisen from lack of ambition for on his return in 1050, with a com-

mission as legate to the northern courts from Pope Leo IX., he immediately set about carrying out the emperor's wishes by establishing himself in an independent patriarchate of the north. For this purpose he sought by every means to augment his already great influence, he adorned his two cathedrals, and enlarged and fortified the town of Bremen so that it might rival Rome. There was much in his favour, and he might even have succeeded in entirely separating the church of the north from the see of Rome, had it not been for the death of Henry III., and the opposition of Cardinal Hildebrand. Henry IV. being a minor at the time of his father's death, Adalbert was associated with Archbishop Hanno of Cologne as guardian and regent; and during the absence of the latter on a mission to Rome, he sought, by granting every indulgence, to gain the favour of the young prince, and so to be able to exercise an absolute power in the state (1062-65). The Archbishops of Mayence and Cologne secured his banishment from court after the government had been assumed by Henry in person (1066); and about the same time his diocese was invaded by the "natural enemies" of Bremen, the Saxon nobles. In 1069, however, he was recalled, and reinstated in his former position. He died at Goslar in 1072, having done much during his last years to inflame the Saxons' hatred of Henry, which resulted soon afterwards in their revolt.

ADAM, אָדָם, an appellative noun, meaning the first man. In Genesis ii. 7, 25, iii. 8, 20, iv. 1, &c., it assumes the nature of a proper name, and has the article, *the man*, the only one of his kind; yet it is appellative, correctly speaking. In Genesis i. 26, 27, v. 2, it is simply appellative, being applied to both progenitors of the human race; not to the first man alone as in the second, third, and fourth chapters. The etymology of the word is uncertain, but it is probably connected with a root signifying *red*, so that the idea is one *red* or *ruddy*.

The early part of Genesis contains two accounts of man's creation. These narratives need not be examined at present farther than man's origin is concerned. In Genesis i. 26, 27, we read, "And God said, Let us make man in our image, after our likeness; and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth. So God created man in his own image, in the image of God created he him; male and female created he them." At the end of the sixth day of creation man appears, the noblest of earth's inhabitants. In Genesis ii. 7, 8, we also read, "And the Lord formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul. And the Lord God planted a garden eastward in Eden: and there he put the man he had formed." The woman's creation is thus narrated in subsequent verses of the same chapter—20, 21, 22, 23, "And Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field: but for Adam there was not found an help meet for him. And the Lord God caused a deep sleep to fall upon Adam, and he slept: and he took one of his ribs, and closed up the flesh instead thereof. And the rib, which the Lord God had taken from man, made he a woman, and brought her unto the man. And Adam said, This is now bone of my bones, and flesh of my flesh: she shall be called Woman, because she was taken out of man." Between these accounts some discrepancy exists. The first represents the man and woman to have been created together, after the various creatures which the earth sustains on its surface; the second makes Adam to have been created first, then the various animals, with the woman last of all. The creation of animals separates the origin of the man and the woman. The first narrator states that man was



made in the image and form of God, without explaining his meaning more particularly. Hence interpreters differ in attempting to define it. The language need not be restricted either to man's *spirit* or to his *body*, but may refer to his united whole, including spiritual qualities and bodily form. The ancient Hebrew did not think of God without a certain form, but transferred the human one to him, divesting it of grossness, and giving it an ethereal luminousness of surpassing glory. The image of God, therefore, in which Adam is said to have been created, includes the whole man, with special reference to the spiritual nature within him. We cannot tell whether the writer thought of immortality as involved in the God-likeness. He may have done so. But the second account teaches that man was only mortal at first, because he is sent out of Paradise lest he should become immortal by eating of the tree of life.

The narrative in the first chapter is arranged according to a definite plan. Six days are allotted to the creation of the heavens and earth, with all their furniture animate and inanimate. After due preparation had been made by the formation of light, atmosphere, and land separated from water, life is called into existence, first vegetable, then animal, terminating in man the lord of this lower world. The narrative in chapters ii.-iv. does not present such orderly progress. In it man is the central figure, to whom all is subordinated. He is created first. For him plants and trees are made to spring up. He is placed in a delightful garden. The Lord God perceiving his solitary condition creates the beasts of the field and the fowls of the air; but when brought to the protoplast, they were insufficient to supply his mental void, so that woman was made, in whom he found a suitable partner. A number of questions connected with the first pair, not necessarily entering into the writer's main purpose in describing man's origin, but complementary and new, are, the means by which the ground yielded vegetable productions, the materials from which the man and the woman were formed, the cause of their intimate union, the place of their abode, the simplicity of their condition, and the way in which animals first received their names. By these traits preparation is made for the history of what befell the protoplasts in their primitive abode.

According to the second narrative, Jehovah planted a garden in Eden, eastward, and put the first man there. A spring or stream rising in Eden, and flowing through the garden, supplied it with water. In issuing from the garden it divided itself into four rivers, each having its own course. The writer gives their names, and the countries washed by three of them. This garden, usually termed *Paradise* after the Septuagint and Vulgate, has been eagerly sought for; but it has baffled curiosity. Though two of the rivers, the Euphrates and Tigris, are well known, the other two, Pison and Gihon, can only be identified with difficulty. They seem to be rivers of Northern India. The Tigris and Euphrates took their rise in the high land of Northern Armenia; the Pison, *i.e.*, Indus, rises in the Himalayas; and the Gihon, *i.e.*, Oxus, is connected with Ethiopia or Cush. The writer appears to have considered them all as having their source in the northern highlands of Asia, and flowing south, and therefore he placed Eden somewhere in the north of Asia. The names of two rivers belonging to a foreign tradition, and little known to the Hebrews because intercourse with India was then remote, were associated with those of two known ones incorporated in the national tradition. If the interpreter had to do with pure history, it might not be amiss to search for Eden in some definite locality; but, as the case stands, the examination would probably be fruitless.

The garden has two remarkable productions—the tree

of life, and the tree of knowledge of good and evil. The former derives its name from the virtue of its fruit to impart perpetual life or immortality. The fruit of the latter communicates the knowledge of good and evil. It awakens moral consciousness. The one had to do with physical, the other with spiritual life. Such were the miraculous powers of the two trees in the midst of the garden.

The third chapter gives an account of the first pair falling away from the state in which they were created. What that state was may be clearly gathered from the words. It was one of innocent simplicity. The protoplasts had a child-like unconsciousness of evil; no knowledge of right and wrong, virtue and vice. They were in the happy condition of infancy. Their moral existence had not begun. Perfection, uprightness, righteousness, could not be predicated of them. But the world presents vice and its concomitant misery in strong colours. Misery and evil abound. The eyes of an Oriental especially must have been vividly struck with the phenomena of toilsome work, the pains of child-bearing, the slavery of woman, and the inevitable necessity of death. The Hebrews, accordingly, meditated on the cause. The writer seeks to connect with the problem incidental phenomena, as the love of man and wife, the form of the serpent different from that of other animals, the mutual hatred of man and serpents, &c. It is an old question, the introduction of evil into the world. As all the posterity of the first pair participate in sin and suffering, the cause must be looked for in connection with these. Yet it must not proceed from themselves. God had made them innocent and happy. The origin of evil must come from without. A serpent becomes the instrument of their temptation. That cunning and mischievous animal seduces them. The writer thought of nothing but the creature itself. Those who suppose that the devil employed the serpent as his instrument, or that the devil alone is spoken of, are confronted by the fact that the idea of Satan was of later introduction among the Hebrews than the age of the writer. The curse pronounced on the tempter sufficiently shows that none but the agent expressly named was thought of.

Are these narratives of the creation, primal abode, and fall of man, literal history? So some have always believed, with Augustine and the Reformers. The difficulties in the way of this interpretation are great. As it cannot be carried out consistently, its advocates resort to various expedients. They forsake the literal for the figurative wherever necessity demands. Thus they put a figurative construction on the language of the curse, because they allege that a literal one would be frigid, utterly unworthy of the solemn occasion, highly inconsistent with the dignity of the speaker and the condition of the parties addressed. Sometimes they even incline to regard the narrative as a sort of poem, or give it a poetical character. The atmosphere in which the accounts move is different from the literal one. Instead of assuming that God created the world and all it contains in a moment of time, and in harmonious arrangement, the first writer attributes creation to six successive days, represents the Almighty as addressing the newly-formed existences, looking upon them with satisfaction, pronouncing them good, and resting on the seventh day. He naturally chose the six days of the Hebrew week, with which he was familiar, for successive gradations of the creative power. In the second account we find a speaking serpent, God walking in a human way in the cool of the day through the garden, his jealousy of the aspiring Adam who had attained a higher knowledge, his cursing the serpent, and cherubim with a flaming sword. To explain all this as literal history, were to attribute other perfections to the

Daily than infinite power, spirituality, and wisdom. Hence the Church of England, according to Horsley, does not demand the literal understanding of the document contained in the second and third chapters, as a point of faith.

Are the narratives allegorical? So Philo<sup>1</sup> interprets them, followed by the Greek fathers of Alexandria, Clement and Origen,<sup>2</sup> as well as by Ambrose. In modern times Coleridge read the whole as an allegory.<sup>3</sup> So did Donaldson in his *Jashar*. There is no indication, however, that allegories were intended. Had this been the case, the truths meant to be conveyed would have been easily discovered. The embarrassment and capriciousness of the allegorical interpreters prove that they have followed a wrong method. The outward form is set aside, and an idea discovered beneath it with which the envelope has no necessary connection. Both should be retained; the shell suggesting the kernel, and the kernel showing itself to be the necessary evolution of central ideas.

According to another interpretation, more commonly accepted among scholars at the present day, both accounts are supposed to be, like the early records of other nations, traditional and mythical. This does not imply that they are fables or fictions; far from it. It is true that the oldest traditions of peoples are mainly subjective, the result of the national mind; but they are nevertheless real. Variable, developed in different forms, influenced by the characteristics of the people and by their intercourse with others, they are all that constitutes the earliest history of nations, the shapings of oral tradition before written records appeared. A mythological age stands at the head of all national histories; and that of the Hebrews seems to be no exception. The two narratives present philosophical mythi in a historical form. They represent the best ideas of the Hebrews at a certain stage of their history in explanation of the creation of man, his primeval abode and state, and the cause of his degeneracy. The first account is plain and simple. It assigns a high dignity to man, and traces all human beings to a single pair, in harmony with the best evidence of modern science that points to unity of origin, rather than to different centres of creation. There is a naturalness in the narrative that cannot be mistaken, while the writer adheres to generalities. (See Gabler's *Einleitung zu Eichhorn's Urgeschichte*, vol. i. p. 11, &c.; and Gesenius's article "Adam," in *Erach und Gruber's Encyclopædie*, vol. i.)

On the other hand, the narrator in the second, third, and fourth chapters manifests a more reflective spirit, seeking to explain causes, and to trace connections. Supplying particulars wanting in the older narrative, and correcting others, he enters into details, and though more anthropomorphic, has a finer perception of circumstances associated with the protoplasts. Tholuck himself admits his narrative to be a mythus. It is usual to designate the first writer the Elohist; the second, the Jehovist; because the one commonly uses Elohim as the name of God; the other Jehovah, or Jehovah Elohim in the second and third chapters.

The Adam in the second and third chapters, according to this view, is the progenitor and representative of humanity, who brought misery into the world by self-will. He is ideal man, becoming historical in every individual who, as soon as his moral nature is awakened, feels the power and the possibility of rising higher through reason and perception. Adam's procedure repeats itself in each individual, who has his paradise, eats of the tree of knowledge, and feels within him the roots of apostasy from God. On

the other hand, his restoration and happiness are supposed to be in his own power. His salvation is practicable through the victory of reason over instinct, of faith over sense.<sup>4</sup>

The traditions of ancient nations present analogies to the creation of man given in the first chapter of Genesis. The Etrurian comes nearest to the Hebrew. There creation takes place in six periods of a thousand years each, and men appear in the last, after the earth, sun, moon, and stars, with all living things on the surface of the globe, had been brought into existence by God.<sup>5</sup> The Persian mythology, in like manner, makes Ormuzd, the god of light, create by his word *Honoover* the visible world in six periods of a thousand years each, and man is formed last. The name of the first man is Kaiomorta.<sup>6</sup> The Chaldee myth, given by Berosus, presents little resemblance to the Hebrew narrative. Bel, the highest god, divided the darkness, and cut the woman, who ruled over the monstrous creatures found at first in the *all*, into two halves, out of which heaven and earth were formed. After that he cut off his own head. The blood trickling down was taken by other gods and mixed with earth, from which men were formed, who are therefore wise, and partakers of the divine intelligence.<sup>7</sup> The Phœnician myth is still more unlike the Hebrew account.<sup>8</sup> But Ovid's teaching is that man was made in the image of the gods, and was intended to be ruler of the earth.<sup>9</sup> The Egyptian theology has no point of contact with the Hebrew.<sup>10</sup> The Indian accounts are very numerous, but often discrepant. Their likeness to the Hebrew narrative is remote; for the play of imagination appears in them to excess and absurdity. Among those myths in which the formation of men is described without allusion to any primordial distinction of castes, we may quote two. Prajapati, *i.e.*, the universe which was soul and only one, formed animals from his breaths, a man from his soul. The soul is the first of the breaths. Since he formed a man from his soul, therefore they say, "man is the first of the animals, and the strongest." The soul is all the breaths; for all the breaths depend upon the soul. Since he formed man from his soul, therefore they say, "man is all the animals;" for all these are man's.<sup>11</sup> Mann's account of the creation is that men of the four castes proceeded separately from different parts of Brahma's body prior to the division of that body into two parts. The doctrine of emanation appears in the Indian cosmogonies, as also that of absorption. Thus Brahma is reabsorbed into the supreme spirit, according to Manu.<sup>12</sup> According to the Bamians in India, God having made the world and the creatures belonging to it, created man, who came forth from the earth at the divine voice, his head appearing first, then his whole body, into whom life was conveyed. God gave him for companion a woman, and the two lived together as man and wife, feeding on the fruits of the ground. They had four sons of different temperaments, for whom God made four women, and the four quarters of the earth were peopled by their progeny.<sup>13</sup>

The paradisiacal state of the first pair, and their loss of it as described in the second and third chapters of Genesis, have their parallels in the myths of ancient nations. According to the Persian traditions, Meschia and Meschiane, the progenitors of mankind, were created for happiness in

<sup>4</sup> See Tuch's *Kommentar ueber die Genesis*, p. 50.

<sup>5</sup> *Suidas*, s. v. *Tuphnia*, vol. ii. pp. 1248-9, ed. Bernhardt.

<sup>6</sup> *Kleinler*, i. 19, 20; iii. 59, &c.

<sup>7</sup> Eusebius's *Chron. Bipartitum*, vol. i. p. 24, ed. Aucher.

<sup>8</sup> See *Sanchoniatho*, translated by Cory, in the *Phœnix*, p. 185, &c., ed. New York.

<sup>9</sup> *Metamorphos.* i. 76, &c.; Opera ed. Burmann, tom. ii. p. 20.

<sup>10</sup> Roeth's *Geschichte der Philos.* i. p. 181, &c.

<sup>11</sup> Muir's *Sanskrit Texts*, vol. i. p. 24, 2d ed.

<sup>12</sup> *Ibid.* p. 53, &c.

<sup>13</sup> See Lort's *Display of two Foreign Sects in the East Indies*, chapter i. p. 1, &c.

<sup>1</sup> *De mundi Opificio*, p. 87, vol. i. ed. Mangey.

<sup>2</sup> *Philocalia*, cap. 1, and contra Cels.

<sup>3</sup> *Aids to Reflection*, p. 241, note (Burlington edition of 1840).



this world and the next, on condition that they were good, and did not worship Dews. At first they acted according to their original nature, acknowledging that all beings were derived from Ormuzd. But they were seduced by an evil spirit, and clothed themselves in black for thirty days. After that they went out to hunt, and found a white goat, of whose milk they drank. In this they sinned against their body, and were punished. The evil spirit or Dew presented himself to them again, giving them fruits to eat, by which they forfeited a hundred enjoyments. At first they covered themselves with the skins of dogs, and ate the flesh of these animals. They hunted and made themselves clothing of the skins of deer.<sup>1</sup>

Abriman is represented as a poisonous serpent, and springs in this form from heaven to earth.<sup>2</sup> Dews often take the same form.<sup>3</sup>

The tree *Hom* among them is similar to the tree of life. It imparts immortality, and is called the king of trees.<sup>4</sup>

The holy mountain or paradise of Persian tradition is *Albordj*, the abode of Ormuzd and the good spirits, which sends forth great rivers.<sup>5</sup> This means the Hindu Koosh mountains where was *Airjana veejjo*, the first seat of the Aryan race. Here we have mention of a district *Heden*; and Zoroaster is said to have been born in *Hedenesch*, but elsewhere in *Airjana veejjo*.<sup>6</sup>

According to the religion of Lama or the Calmucks, men lived in the first age of the world 80,000 years. They were holy and happy. But their happiness came to an end. A plant, sweet as honey, sprang out of the earth, of which a greedy man tasted, and made others acquainted with it. A sense of shame was awakened, and therefore they began to make themselves coverings of the leaves of trees. Their age and size decreased. Virtue fled, and all manner of vice prevailed.<sup>7</sup> The paradisiacal state of Thibetan mythology is one of perfection and spirituality. But the desire to eat of a sweet herb, *schima*, put an end to that condition. Shame sprang up within the fallen; the need of clothing was felt. They were driven to agriculture by necessity. Virtue fled, murder, adultery, and all other vices succeeded.<sup>8</sup>

Among the Indians, the holy mountain or the north, the seat of the gods, and the source of the great rivers, was *Meru*.<sup>9</sup> The tree *Parjata*, brought from heaven to earth by Krishna, with its heavenly flower and fruit, scares away hunger, thirst, disease, old age, &c.<sup>10</sup>

The Greek myths are remotely parallel. Hesiod describes the primitive state as one free from toil, sickness, and all kinds of evil. Mortals were contented with easily obtained, though poor, sustenance. But cunning Prometheus deceived Zeus, and stole fire from heaven. The latter, by way of punishment, sent a beautiful woman, Pandora, whom Epimetheus accepted as a gift. Having with her a vessel into which all sorts of misery had been put, she opened it out of curiosity, and evils flew forth in abundance, filling the earth. Hope alone remained at the bottom.<sup>11</sup>

The story is supplemented and modified in the *Theogony*. There Prometheus is twice punished, and woman becomes the source of man's evils, merely as the original mother of the race. There is also a reconciliation between Zeus and Prometheus.<sup>12</sup>

In Æschylus mankind are presented in the ignorance of

infancy till Prometheus implanted in them the power of intellect, and the capability of knowledge. The fire from heaven is not the cause of the evils that broke in upon them; rather is it the teacher of every art, and the opener up of infinite resources; but Prometheus himself must endure fearful punishment for his self-will, in paying too much regard to mortals. Still there is an intimation of future reconciliation between the opposing powers, Zeus and Prometheus.

The points of similarity between the Old Testament and this Greek representative of man's fall are tolerably plain.<sup>13</sup> In both there is an original state marked by freedom from sorrow, by complete earthly enjoyment and undisturbed peace with God. Both attach the origin of evil to the act of a free being putting himself in opposition to God—evil being the punishment of that act, arising by means of a woman. As the Old Testament narrative implies that the step taken by man was not a mere degeneracy, so Æschylus's description admits that it was for humanity the beginning of a richer and higher life, since man's proper destiny could not be worked out in a condition of childlike incapacity. Pandora reminds us of Eve; Epimetheus of Adam. Prometheus and the serpent both wish to make men like God in knowledge and happiness.<sup>14</sup> The tragic poet seems to regard Prometheus as the archetype of man, so that his fate is theirs. Like every strong-willed mortal, Prometheus flounders on the rock of presumption. He persists in acting contrary to the commands of Deity, and endures torture till he submits to a higher will, accepting the symbols of repentance and restraint within certain limits. Thus like Adam, he is the representative of humanity.

The fundamental difference between the Hebrew and Greek narratives is, that the distinction between God and the world, spirit and nature, maintained with all sharpness in the one, is not carried out in the other. On the contrary, the Greek myth mixes the two spheres, so that the world appears as the original, independent element, of which spirit and deity are mere products. In the Hebrew narrative the spiritual features are presented clearly and simply; in the Greek they are indistinct, because transferred to the sensuous world and covered with a luxuriant growth of outer nature.<sup>15</sup>

Ovid paints the golden age in the manner of Hesiod, but with more details. It was pervaded by innocent simplicity, and the successive ages became still worse, till moral corruption reached such a height in the last or iron age that Jupiter sent a flood to destroy all mankind.<sup>16</sup>

Plato in his *Symposium*<sup>17</sup> explains the sexual and amatory inclination of the man and the woman by the fact that there were at first androgynous beings, whom Zeus separated into men and women. The two sexes were originally united.

In Corrodi's *Beiträge* (xviii. p. 14), the Indian *Ezour Vadam* is quoted, in which the first man is called *Adimo*, from whose body came Brahma, Vishnu, and Schiva. This statement is repeated by Knobel and others. But the *Ezour Vadam* (a corrupt pronunciation of Yajur Veda) is a spurious Veda from the pen of some Jesuit missionary.<sup>18</sup> Though it mentions *Adimo* (which simply means the first) in vol. i. p. 195, &c., and vol. ii. 205, genuine Indian mythology recognises no such name of the first man.

The second narrative, in some of its ideas, seems de-

<sup>1</sup> Kleuker's *Zend-Avesta*, part iii. pp. 84, 85.

<sup>2</sup> *Ibid.* iii. 62.

<sup>3</sup> *Ibid.* ii. 192.

<sup>4</sup> *Ibid.* iii. p. 105.

<sup>5</sup> *Ibid.* iii. 70, 91.

<sup>6</sup> *Ibid.* ii. 277, 290; iii. 118.

<sup>7</sup> Stäudlin in *Archiv. für Kirchengeschichte*, i. 3, p. 14.

<sup>8</sup> See Stäudlin's *Archiv*, i. 3, p. 15.

<sup>9</sup> See Böhlen's *Das alte Indien*, i. 12; ii. 210.

<sup>10</sup> Wilson's *Vishnu Purana*, pp. 586, 618; and Langlois's translation of the *Harivansa*, tom. ii. p. 3.

<sup>11</sup> *Opera et Dies*, 40-105.

<sup>12</sup> *Ibid.* 506-616.

<sup>13</sup> See Buttman's *Mythologus*, Band i. p. 43, &c.

<sup>14</sup> See G. Baur in the *Studien und Kritiken* for 1843, p. 320, et seq.

<sup>15</sup> *Metamorphos.* i. 89, &c.; vol. ii. p. 14, &c., ed. Burmann.

<sup>16</sup> Cap. xv. ed. Stallbaum, 1827.

<sup>17</sup> The *Ezour Vadam* was printed at Paris in 1778. See Mr Ellis, in the *Asiatic Researches*, vol. xiv. p. 2, &c., and Dr Muir in the *Transactions of the Royal Society of Edinburgh*, vol. xxiii. part 2, p. 255, &c.

rived from Eastern Asia. Several features disclose this; such as the covering of fig leaves, the springing of four rivers from a common source, and the names of two of them which point to India. The tree of life and the seducing spirit have their place in the Persian and Indian religions. But its essence is adapted to the Hebrew theology, and contains genuine Hebrew traits; though it stands tolerably isolated in the circle of ideas which the Old Testament presents. Not till the Book of Wisdom do we find express reference to it (chap. ii. 23, 24), though the tree of life is spoken of in the Proverbs. Yet there is diversity amid similarity. As elaborated by the Hebrew mind, the narrative is a profound theory, with noble features worthy of the subject. Its verisimilitude is apparent. It shows a thoughtful contemplation of human nature, a fine sense of its capacities and weakness, of its aspirations and needs. Its lines are drawn with great discernment. The problem need expect no better solution in this life; for its depths cannot be fathomed by the sounding-line of a finite understanding. Here is the one philosophy of the subject that has taken the deepest hold of the human mind, engrafting itself on the religious systems of very different races, and enlisting the sympathies of the most civilised nations. Originating in the East, it has been transferred to the West, where it lives in pristine vigour. It is the essence of the best ideas and traditions of Eastern Asia, improved and enlarged by the Hebrew mind at a certain period. The more the narrative is examined, the more clearly will it appear the result of enlightened reason. It embodies national traditions of Hebrew reflectiveness. Free from the pantheism and dualism inherent in the mythologies of other peoples, the monotheism which distinguished the Hebrews as the depositaries of a divine truth pervades it. The tradition has two sides. It represents the transition of man to freedom and humanity, as Schiller describes it; his elevation by the awakening exercise of reason; his advance from nature's cradling-season to a consciousness of the divine within him; but it represents at the same time the inclination to follow his own will, to aspire to the forbidden contrary to his better conviction, to push reason beyond the limits within which alone it can be legitimately used; in short, to break away from the will of God in self-sufficient independence. While the fact was one of the most fortunate in man's history, it was also one of the saddest. When moral good was made possible, moral evil was introduced. A knowledge of the one brings that of the other.<sup>1</sup>

After Adam fell, God drove him from paradise, whose gates were guarded by cherubim to prevent access to the tree of life. The protoplasts had first three sons—Cain, Abel, Seth; then other sons and daughters. Adam died at the age of 930. According to the Elohist, the later race of men descended from Seth, the first born (Genesis v.); according to the Jehovist from Cain, who was the first born (Genesis iv.) A Jewish tradition represents him as buried in Hebron with the patriarchs; a Christian one makes Golgotha his resting-place.

A number of absurd fables, the fancies of Jewish writers, have gathered round the simple narratives of the Old Testament, and are incorporated in the Talmud. In these Adam is said to have been made as a man-woman out of dust collected from every part of the earth; his head reached to heaven, and the splendour of his face surpassed the sun. The very angels feared him, and all creatures hastened to pay him devotion. The Lord, in order to display his power before the angels, caused a clasp to fall upon him, took away something from all his members, and

when he awoke commanded the parts that had been removed to be dispersed over the globe, that the whole earth might be inhabited by his seed. Thus Adam lost his size, but not his completeness. His first wife was Lilith, mother of the demons. But she flew away through the air; and then the Lord created Eve from his rib, brought her to Adam in the most beautiful dress, and angels descending from heaven played on heavenly instruments; sun, moon, and stars dancing. He blessed the pair, and gave them a feast upon a table of precious stone. Angels prepared the most costly viands. But Adam's glory was envied by the angels; and the seraph Sammael succeeded in seducing him. The pair were driven out of paradise into the place of darkness, and wandered through the earth.<sup>2</sup>

According to the Koran, God created man of dried clay like an earthen vessel, animating the figure, and enduing it with an intelligent soul. When he had placed him in paradise, he formed Eve out of his left side. All the angels worshipped the new man except Eblis, who refused and became an unbeliever. Satan caused them to forfeit paradise, and turned them out of their state of happiness. On Adam's repentance, God pitied him, and had him taught the divine commandments by the archangel Gabriel; whereupon he was conducted to Arafat, a mountain near Mecca, and found Eve after a separation of 200 years. He was buried on Mount Abukais, near Mecca.<sup>3</sup> Many other fables of the later Jews respecting Adam are collected by Eisenmenger, and those of the Mahometans by Herbelot.

In the emanation systems of the Christian Gnostics and Manichæans, as well as in the gnosis of the Mandæans, Adam is represented as one of the first and holiest sons. Both catholic and heretical literature indulged in fictions respecting Adam. A *Life of Adam* was translated from the Ethiopic into German by Dillmann, in Ewald's *Jahrbuch*, v. *The Testament of Adam*, current in Syriac and Arabic, was published by Renan in the *Journal Asiatique*, série v. tom. 2. Both these seem to be derived from the *Spelunca Thesaurorum*, which exists in MS. in the Syriac tongue. The Sethites, a Gnostic sect, had *Apocalypses of Adam*; other Gnostics had a *Gospel of Eve*. A *Book of the Repentance of Adam* and a *Book concerning the Daughters of Adam*, are condemned in the decree of Gelasius. George Syncellus cites a Greek *Life of Adam*; and a fragment from *The Greek Book of Adam*, in a Florentine MS., is given in the *Literaturblatt des Orients* for 1850. Thus the Adam-literature is copious.<sup>4</sup> The *Book of Adam*, published by Norberg in 1816, is improperly so termed. It is a Mandæan or Sabian work, *Sidra Rabba*, which is now better known, since Petermann's critical edition of 1867, and Noldeke's researches into the language. (s. d.)

ADAM of BREMEN, ecclesiastical historian, was born in Upper Saxony, and in 1067, probably on the invitation of Archbishop Adalbert, came to Bremen, where he was appointed canon and *magister scholarum*. He died in 1076. His *Gesta Hammaburgensis Ecclesie Pontificum*, containing a history of the diocese of Hamburg and Bremen from 788 till the death of Adalbert in 1072, is of great importance as the chief source of information in regard to the state of the northern kingdoms during the period of which it treats. It is supposed to have been compiled partly from written documents and partly from the oral communications of the Danish king, Svend Estrithson. Its statements are generally trustworthy, though the chronology is sometimes confused, and the geographical informa-

<sup>1</sup> Eisenmenger's *Entdecktes Judenthum*, Amsterdam, 1700, 4to.

<sup>2</sup> Herbelot's *Bibliothèque Orientale*, a. v. "Adam," p. 53, &c., ed. 1697, Paris.

<sup>4</sup> See Dillmann in Herzog's *Encyclopædie*, xii. p. 319.

<sup>1</sup> See Schelling's *Magisterdissertation* in vol. i. of his *Sämmtliche Werke*, p. 8, &c.



tion often erroneous. The style is clear and interesting, though somewhat prolix. It was first published from MSS. at Copenhagen in 1579. The best edition is that of Lappenberg in Pertz's *Monumenta Germanica*. A supplement to the *Gesta*, a geographical work of considerable value, entitled *De Situ Danica et Reliquarum quæ trans Daniam sunt Regionum Natura*, was published at Stockholm in 1615, and at Leyden in 1629.

ADAM, ALEXANDER, Rector of the High School, Edinburgh, was born on the 24th of June 1741, near Forres, in Morayshire. From his earliest years he showed uncommon diligence and perseverance in classical studies, notwithstanding many difficulties and privations. In 1757 he went to Edinburgh, where he studied at the University with such success that in eighteen months he was appointed head-master of Watson's Hospital, being at the time only nineteen. He was confirmed in the office of Rector of the High School on the 8th of June 1768, on the retirement of Mr Matheson, whose substitute he had been for some time before. From this period he devoted himself entirely to the duties of his office, and to the preparation of the numerous works he published in classical literature. His popularity and success as a teacher are strikingly illustrated in the facts that his class increased more than fourfold during his incumbency, and that an unusually large proportion of his pupils attained to eminence, among them being Sir Walter Scott, Lord Brougham, and Jeffrey. He succeeded in introducing the study of Greek into the curriculum of the school, notwithstanding the opposition of the University headed by Principal Robertson. In 1780 the University of Edinburgh conferred upon Mr Adam the honorary degree of Doctor of Laws. He died on the 18th December 1809, after an illness of five days, during which he occasionally imagined himself still at work, his last words being,—“But it grows dark; you may go.” Dr Adam's first publication was his *Principles of Latin and English Grammar* (1772). This was followed by his *Roman Antiquities* (1791), his *Summary of Geography and History* (1794), and his *Latin Dictionary* (1805). The MS. of a projected larger Latin dictionary, which he did not live to complete, lies in the library of the High School.

ADAM, MELCHIOR, German divine and biographer, was born at Grottkaw in Silesia after 1550, and educated in the college of Brieg, where he became a Protestant. He was enabled to pursue his studies there by the liberality of a person of quality, who had left several exhibitions for young students. In 1598 he went to Heidelberg, where, after holding various scholastic appointments, he became rector of the gymnasium. In 1615 he published the first volume of his *Vitæ Germanorum Philosophorum, &c.* This volume was followed by three others; that which treated of divines was printed in 1619; his lives of lawyers and of physicians were published in 1620. All the learned men whose history is contained in these four volumes lived in the 16th or beginning of the 17th century, and are either Germans or Flemings; but he published in 1618 the lives of twenty divines of other countries in a separate volume, entitled *Decades duæ continentes Vitæ Theologorum Exteriorum Principum*. All his divines are Protestants. His industry as a biographer is commended by Bayle, who acknowledges his obligations to Adam's labours. Lutherans and Catholics accuse him of unfairness, but the charge is at least exaggerated. He died in 1622.

ADAM, ROBERT, architect, the second son of William Adam of Maryburgh, in Fife, was born in 1728. He studied at the University of Edinburgh, and probably received his first instruction in architecture from his father, who, whether a professional architect or not, gave proofs of his skill and taste in the designs of Hopetoun House and the Edinburgh Royal Infirmary. In 1754 young Adam

visited the Continent, and spent three years in Italy for the purpose of examining the ruins of Roman architecture. The magnificence of the public baths erected at Rome in the time of Diocletian having impressed him with the idea that there had been a marked revival of architectural art during that emperor's reign, he resolved to visit the ruins of the private palace Diocletian had erected at Spalatro in Dalmatia. In company with Clerisseau, a French architect, he sailed from Venice in July 1754, and in a few weeks, with the help of two experienced draughtsmen, had completed plans and views of the fragments, from which he was afterwards able to execute a design of the entire building. The results were published in the *Ruins of the Palace of Diocletian, &c.* (1764). After his return to England he rose to the highest eminence in his profession, and was appointed architect to the king in 1762. Six years later he entered Parliament as representative of the county of Kinross, but he still continued to devote himself to the duties of his profession, resigning only his court appointment. In 1773-78 he and his brother James, also an architect of considerable note, published from time to time large folio engravings with letterpress description of their designs, the most important being,—Lord Mansfield's house at Caenwood; Luton House, Bedfordshire; the Register House, Edinburgh, &c. Among their later works may be mentioned the buildings erected in London by the two brothers, and hence called the Adelphi (ἀδελφοί), which proved an unsuccessful speculation; Portland Place, London; and the Infirmary of Glasgow. The leading characteristics of all these designs are lightness and elegance; and, though grave faults may be found with his style, it cannot be denied that English architecture, especially that of the streets of London, owes very much to Robert Adam. He continued actively engaged in his profession until his death in 1792. James, his brother and associate in labour, died in 1794.

ADAM, RIGHT HON. WILLIAM, nephew of the preceding, eldest son of John Adam, Esq. of Blair-Adam, Kinross-shire, was born on the 2d August 1751, studied at the Universities of Edinburgh and Glasgow, and passed at the Scotch bar in 1773. Soon after he removed to England, where he entered Parliament in 1774, and in 1782 was called to the Common-law bar. He withdrew from Parliament in 1795, entered it again in 1806 as representative of the united counties of Clackmannan and Kinross, and continued a member, though with some interruptions, till 1811. A popular though not an eloquent speaker, Mr Adam soon took a prominent place in the House, making himself of importance by his sound judgment and firm general adherence to the Whig party. A duel in 1779 between him and Mr Fox, in which the latter was slightly wounded, did not interrupt their close and steady friendship. They both belonged to the small but noble band that opposed the encroachments of the Government on the Constitution during the period of the French Revolution. One of Mr Adam's most valuable parliamentary efforts was the agitation which he successfully raised, in March 1794, against the severe punishment awarded in the Scotch criminal court to certain persons who had been convicted of sedition. At the English bar he was as successful as any one can be who does not devote himself entirely to the profession. Though known to be much engaged in Parliament, and with the management of the pecuniary affairs of the Prince of Wales and the Duke of York, he obtained a very considerable practice. He was successively Attorney and Solicitor General to the Prince of Wales, one of the managers of the impeachment of Warren Hastings, and one of the counsel who defended the first Lord Melville when impeached (as Mr Dundas). During his party's brief tenure of office in 1806 he was Chancellor of the Duchy of Cornwall, and was afterwards a privy councillor

and lord-lieutenant of Kinross-shire. In 1814 he became a baron of Exchequer in Scotland, and in the following year was appointed chief commissioner of the newly-established Jury-Court for the trial of civil causes, over which he presided with much ability and acceptance till 1830, when it ceased to exist as a separate court, and became merged in the permanent supreme tribunal. Though little versed in the technicalities of law, he was in all practical matters an able manager; he was a shrewd observer of all that passed around him, and a most agreeable companion. He died at Edinburgh on the 17th February 1839.

**ADAM'S BRIDGE**, or *Rama's Bridge*, a chain of sandbanks, extending from the island of Manaar, near the N.W. coast of Ceylon to the island of Rameseram, off the Indian coast, and lying between the Gulf of Manaar on the S.W. and Palk Strait on the N.E. It is more than 30 miles long, and offers a serious impediment to navigation. Some of the sandbanks are dry; and no part of the shoal has a greater depth than 3 or 4 feet at high water, except three tortuous and intricate channels, a few feet deep, which in calm weather permit the passage of boats and small vessels.

**ADAM'S PEAK**, a lofty mountain in Ceylon, about 45 miles E. from Colombo, in N. lat. 6° 55', E. long. 80° 30'. It rises steeply to a height of 7240 feet, and commands a magnificent prospect. Its conical summit terminates in an oblong platform, 74 feet by 24, on which there is a hollow, resembling the form of a human foot, 5 feet 4 inches by 2 feet 6 inches; and this has been consecrated as the footprint of Buddha. The margin of this supposed footprint is ornamented with gems, and a wooden canopy protects it from the weather. It is held in high veneration by the Cingaleso, and numerous pilgrims ascend to the sacred spot, where a priest resides to receive their offerings, and bless them on their departure. By the Mahometans the impression is regarded as that of the foot of Adam, who here, according to their tradition, fulfilled a penance of one thousand years, while the Hindoos claim it as that of their god Siva.

**ADAMAWA**, a country of Central Africa, lies between 7° and 11° N. lat., and 11° and 16° E. long., about midway on the map between the Bight of Biafra and Lake Chad. Its boundaries cannot be strictly defined; but it stretches from S.W. to N.E. a distance of 200 miles, with a width of from 70 to 80 miles. This region is watered by the Benuwe and the Faro. The former, which ultimately unites with the Niger, flows through Adamawa, first in a northerly, then in a westerly direction; and is joined by the Faro, which rises in the south, 22 miles from Yolla, the capital of the country. Near their confluence the Benuwe is 800 yards wide, with a depth of about 11 feet; the Faro has a breadth of 600 yards, but is generally very shallow. Both rivers are subject to extraordinary floods, beginning in the end of September, and lasting forty days, during which the swamps of the adjacent country are covered for a great distance on both sides, and the Benuwe rises at least 30 feet. The most fertile parts of the country are the plains near the Benuwe, about 800 feet above the level of the sea. Further from that river the land rises to an elevation of 1500 feet, and is diversified by numerous hills and groups of mountains. Mount Alantika, about 25 miles S.S.E. of Yolla, is the loftiest mountain in Adamawa, and rises from the plain, an isolated mass, to the height of 9000 feet. The country, which is exceedingly rich, and is covered with luxuriant herbage, has many villages, and a considerable population. The grain known as *Holcus sorghum* or *durra*, ground-nuts, yams, and cotton are the principal products; and the palm and banana abound. Elephants are very numerous, and ivory is largely exported. In the eastern part of the country the rhino-

ceros is met with, and the rivers swarm with crocodiles, and with a curious mammal called the *ayu*, bearing some resemblance to the seal. Yolla, the capital of Adamawa, is situated, in N. lat. 9° 28', E. long. 12° 13', in the fertile plain between the Benuwe and the Faro. The houses are built of clay, and surrounded by court-yards, in which grain is grown; so that the town, though containing only about 12,000 inhabitants, is spread over a large extent of ground, and is 3 miles long from east to west. *Turkedî* (a dark-coloured cotton cloth), beads, salt, and calico are the principal articles exposed in the markets. Here and throughout Adamawa cotton is generally used as a medium of barter. A very large proportion of the population are slaves, many private individuals holding as many as 1000, while the governor is said to receive annually about 5000 in tribute. The government of Adamawa is in the hands of a Mahometan ruler, who owns a nominal allegiance to the Sultan of Sokoto, but is in reality an independent sovereign. Formerly the country was called Fumbina, and was possessed by various African tribes, until it was overrun by the Fulbe, a Mahometan people. It has not been entirely subjected by them, but they have detached settlements at various places; and numerous governors, as well of the Fulbe as of outlying pagan tribes, are in subjection to the ruler of Yolla. (See *Barth's Travels in Central Africa*, vol. ii.)

**ADAMITES**, or **ADAMIANs**, a sect of heretics that flourished in North Africa in the 2d and 3d centuries. Basing itself probably on a union of certain gnostic and ascetic doctrines, this sect pretended that its members were re-established in Adam's state of original innocency. They accordingly rejected the form of marriage, which, they said, would never have existed but for sin, and lived in absolute lawlessness, holding that, whatever they did, their actions could be neither good nor bad. During the Middle Ages the doctrines of this obscure sect, which did not at first exist long, were revived in Europe by the Brethren and Sisters of the Free Spirit, who in the 14th century were better known throughout Germany as Beghards. This name was originally borne by a religious party that was formed in the Netherlands a century earlier. The two sects came into contact on the Rhine frontier, associated with each other, gradually approximated in doctrine, and were at last identified by the application to both of the one name; though a distinct sect of Beghards, free from the excesses of the brethren, continued to exist in the Netherlands. *Picard* is simply another form which *Beghard* assumed in the harsh pronunciation of the Bohemians, and the common method of accounting for it by supposing a leader *Picard* has no sufficient warrant. The principal seat of the Picards in Bohemia was a small island in the river Luschnitz, where they lived in a state of nature, and had wives in common. In 1421 they were almost exterminated by Ziska, the leader of the Hussites, who committed many of them to the flames. In 1849 it appeared that the sect existed in a district of Austria, though small in number, and not ostentatious of its peculiar practices. (*Rüdinger de Eccl. Frat. in Bol'em.*, &c.; *Bossuet's Variations of Protestant Churches*.)

**ADAMNAN** or **ADOMNAN**, **SAINT**, born in Ireland about the year 624, was elected Abbot of Iona in 679, on the death of Faílbe. While on a mission to the court of King Aldfrid of Northumberland (700-1), he was led to adopt the Roman rule in regard to the time for the observance of Easter; and on his return to Iona he tried to enforce the change upon the monks, but without success. It is said that the disappointment caused his death, which occurred in 703 or 704. Adamnan wrote a *Life of St Columba*, which, though abounding in fabulous matter, is of great interest and value. The best edition is that of Reeves.



published by the Irish Archaeological and Celtic Society in 1857. Adamnan's other well-known work, *De Situ Terrarum Sanctarum*, was based, according to Bede, on information received from Arculf, a French bishop, who, on his return from the Holy Land, was wrecked on the west coast of Britain, and was entertained for a time at Iona. This was first published by Gretser at Ingolstadt in 1619. (*Kalendar of the Scottish Saints*, by Bishop Forbes, 1872.)

ADAMS, JOHN, a distinguished statesman of the United States of North America. He was born on the 19th or (new style) 30th of October 1735, in that part of the township of Braintree, in Massachusetts, which on a subsequent division was called Quincy. His parents were of that class, then abounding in New England, who united the profession of agriculture with that of some one of the mechanic arts. His ancestor Henry had emigrated from Devonshire in the year 1632, and had established himself at Braintree with six sons, all of whom married: from one descended the subject of this memoir, and from another that Samuel Adams who, with John Hancock, was by name proscribed by an Act of the British Parliament, for the conspicuous part he acted in the early stages of the opposition to the measures of the mother country. When about fifteen years of age, his father proposed to his son John either to follow the family pursuits, and to receive in due time, as his portion, a part of the estate which they had cultivated, or to have the expense of a learned education bestowed upon him, with which, instead of any fortune, he was to make his way in future life. The son chose the latter alternative; and having received some preparatory instruction, was admitted a student at Harvard College in the year 1751. After graduating in 1755, he removed to the town of Worcester, where, according to the economical practice of that day in New England, he became a tutor in a grammar school, and at the same time was initiated into the practice of the law in the office of Mr Putnam, then an attorney and a colonel of militia, and subsequently a general of some celebrity in the revolutionary war. A letter he wrote at the early age of nineteen, shows a degree of foresight which, like many other predictions, may have led to its own accomplishment. It is dated 12th October 1754, and says—"Soon after the Reformation, a few people came over to this New World for conscience's sake. Perhaps this apparently trivial incident may transfer the great seat of empire to America. It looks likely to me; for if we can remove the turbulent Gallic (the French in Canada), our people, according to the exactest computation, will in another century become more numerous than England itself. Should this be the case, since we have, I may say, all the naval stores of the nation in our hands, it will be easy to obtain the mastery of the seas, and then the united force of all Europe will not be able to subdue us. The only way to keep us from setting up for ourselves is to disunite us."

He was admitted to practice in the year 1758, and gradually rose to the degree of eminence which a local court can confer; and obtained distinction by some essays on the subject of the canon and feudal law, which were directed to point to the rising difference which commenced between the mother country and the colonies, soon after the peace of 1763 had delivered the latter from all disquietude respecting the establishments of France in the adjoining province of Canada. His character rose, both as a lawyer and a patriot, so as to induce Governor Barnard, who wished to gain him over to the royal party, to offer him the office of advocate-general in the Admiralty Court, which was deemed a sure step to the highest honours of the bench. Two years after, he was chosen one of the representatives of his native town to the congress of the province. His first prominent interference in political affairs was at a meeting at Braintree in 1765, to oppose the Stamp Act.

The resolutions he proposed were not only carried unanimously, but were afterwards adopted verbatim by more than forty other towns. In 1768 he found it necessary to remove to Boston, owing to the increase of his legal practice.

His professional integrity was soon after eximious in the defence of Captain Preston and some soldiers, who were tried before a Boston jury on a charge of murder, April 1770. In this case Adams was counsel for the defence; and being considered by the people, then in an inflamed state against the troops, as a determined friend of liberty, his eloquence obtained a verdict of acquittal without lessening his popularity.

When it was determined, in 1774, to assemble a general congress from the several colonies, Mr Adams was one of those solicited for the purpose by the people of Massachusetts. Before departing for Philadelphia to join the congress, he parted with the friend of his youth, his fellow-student and associate at the bar, Jonathan Sewall, who had attained the rank of attorney-general, and was necessarily opposed to his political views. Sewall made a powerful effort to change his determination, and to deter him from going to the congress. He urged, that Britain was determined on her system, and was irresistible, and would be destructive to him and all those who should persevere in opposition to her designs. To this Adams replied: "I know that Great Britain has determined on her system, and that very fact determines me on mine. You know I have been constant and uniform in opposition to her measures; the die is now cast; I have passed the Rubicon; to swim or sink, live or die, survive or perish with my country, is my unalterable determination." The conversation was then terminated by Adams saying to his friend, "I see we must part; and with a bleeding heart, I say, I fear for ever. But you may depend upon it, this adieu is the sharpest thorn on which I ever set my foot."

When the continental congress was assembled Mr Adams became one of its most active and energetic leaders. He was a member of that committee which framed the Declaration of Independence, and one of the most powerful advocates for its adoption by the general body; and by his eloquence obtained the unanimous suffrages of that assembly. Though he was appointed chief-justice in 1776, he declined the office, in order to dedicate his talents to the general purpose of the defence of the country.

In 1777 he, with three other members, was appointed a commissioner to France. He remained in Paris about a year and a half, when, in consequence of disagreements among themselves, in which Adams was not implicated, all but Franklin were recalled. In the end of 1779 he was charged with two commissions,—one as a plenipotentiary to treat for peace, the other empowering him to form a commercial treaty with Great Britain. When he arrived in Paris, the French Government viewed with jealousy the purpose of the second commission; and Count de Vergennes advised him to keep it secret, with a view to prevail on the congress to revoke it. Mr Adams refused to communicate to the count his instructions on that subject; and an altercation arose, from a claim made by France for a discrimination in favour of French holders of American paper money in the liquidation of it. The count complained to Congress, transmitted copies of Mr Adams's letters, and instructed the French minister at Philadelphia to demand his recall. The demand was rejected, but afterwards four others were joined with him in the commission. Whilst these negotiations were in progress he went to Holland, and there, in opposition to the influence and talents of the British minister, Sir Joseph Yorke, succeeded both in negotiating a loan, and in procuring the assistance of that country in the defence against Great Britain. He formed a commercial treaty with

that republic, and joined in the ephemeral association called "the armed neutrality."

In 1785 Mr Adams was appointed ambassador to the court of his former sovereign, where his conduct was such as to secure the approbation of his own country, and the respect of that to which he was commissioned. Whilst in London, he published his work entitled *Defence of the American Constitution*, in which he combated ably the opinions of Turgot, Mably, and Price, in favour of a single legislative assembly; and thus perhaps contributed to the division of power and the checks on its exercise, which became established in the United States. At the close of 1787 he returned, after ten years devoted to the public service, to America. He received the thanks of Congress, and was elected soon after, under the presidency of Washington, to the office of Vice-President. In 1790 Mr Adams gave to the public his *Discourses* on Davila, in which he exposed the revolutionary doctrines propagated by France and her emissaries in other countries. On the retirement of Washington, the choice of President fell on Mr Adams, who entered on that office in May 1797. At that time the Government was entangled by the insolent pretensions of the French demagogues, and by their partisans in many of the states. Great differences of opinion arose between the individuals at the head of affairs: one party, with Mr Hamilton at their head, was disposed to resist the pretensions of France by open hostilities; whilst Mr Adams was disinclined to war, so long as there was a possibility of avoiding it with honour. Owing to this division of his own friends; rather than to a want of public confidence, at the conclusion of the four years for which the President is chosen, Mr Adams was not re-elected. Perhaps this was in some measure owing to the preponderance of the slave states, in which Mr Jefferson, his rival, and a proprietor of slaves, had a fellow-feeling among the chief of the people.

He retired with dignity, at 65 years of age, to his native place, formed no political factions against those in power, but publicly expressed his approbation of the measures which were pursued by him who had been his rival, who had become his successor in power, but had never ceased to be his firmly-attached friend.

The last public occasion on which Mr Adams appeared, was as a member of the convention for the revision of the constitution of Massachusetts, in which some slight alterations were requisite, in consequence of the province of Maine being separated from it.

He seems to have enjoyed his mental faculties to the close of his protracted life; and even on the last day of it, two hours only before its final close, on the 4th July 1826, the fiftieth anniversary of the Act of Independence, he dictated to a friend, as a sentiment to be given at the public dinner of the day, "Independence for ever." By a very singular coincidence Jefferson, his rival and friend, died a few hours earlier on the same day.

Mr Adams was considered a sound scholar, well versed in the ancient languages, and in many branches of general literature. His style in writing was forcible and perspicuous, and, in the latter years of his life, remarkably elegant. In person he was of middling stature; his manners spoke the courtesy of the old school; and his address, at least when he was in England, was dignified and manly.

ADAMS, JOHN QUINCY, eldest son of the preceding, was born at Braintree on the 11th July 1767. The greater part of his education was received in Europe, which he visited in company with his father in 1778, and again in 1780, when he attended for a time the university of Leyden. When only fifteen years old he went, as secretary, with Francis Dana on his unsuccessful mission to St Petersburg. Returning home after an interval spent in Holland, London, and Paris, he graduated at Harvard in

1788; and, after spending three years in a lawyer's office, was admitted to the bar in 1791. Three successive series of letters, on political subjects, contributed to a Boston newspaper, attracted much attention, and Washington appointed him ambassador to the Hague in 1794. An appointment to a similar post in Portugal, made just before the expiry of Washington's presidency, was set aside by his father, who sent him instead to Prussia, giving him the promotion by the express advice of Washington. During his residence as ambassador at Berlin, he succeeded in negotiating a commercial treaty with Prussia. On Jefferson becoming President (1801), Adams was recalled, and resumed the practice of law in Boston. In 1802 Suffolk county returned him a member of the Massachusetts Senate, and in the following year he was elected to Congress. Indebted for his position to the Federal party, Adams supported their views for four years, but separated from them by voting for Jefferson's proposed *embargo*. This course involved him in much controversy, and cost him his seat in the Senate. During his retirement he added to the employment arising from his profession the duties of the professorship of rhetoric and belles lettres at Harvard University, which he held for three years (1806-9). His lectures—the first ever read in an American university—were published in 1810, and were much thought of at the time, though now almost forgotten. In the winter following the resignation of his professorship, he visited Washington; and, in an interview with Jefferson, brought a charge against some of the Federal leaders of a design to dissolve the union, and form a separate confederation for the north. The charge was afterwards repeated in the newspapers; and, though resting on slender grounds, greatly affected the confidence of the other states in the New England representatives. In 1809 Madison, having obtained after some delay the concurrence of the Senate, entrusted Adams with the embassy to St Petersburg,—an appointment which the latter accepted against the wishes of his father, and continued to hold, though offered a seat on the judicial bench of New England some time after his arrival in Russia. When war broke out between England and the United States, Adams induced the Czar to make an offer of intervention, which, however, the English Government declined to accept. Independent negotiations were thereupon carried on for six months at Ghent (the representatives of America being Adams, Russell, and Clay), and resulted in the treaty of peace which was signed 24th December 1814. After serving for two years (1815-17) as minister in London, he again entered the arena of home politics as secretary of state under Monroe. In this office he distinguished himself specially by his arrangement of the treaty with Spain, which defined the boundaries of the ceded territories of Florida and Louisiana. An elaborate report on weights and measures gained for him also a name for scientific acquirements. In 1825 the election of a President fell, according to the constitution of the States, to the House of Representatives, since no one of the candidates had secured an absolute majority of the electors chosen by the States, and Adams, who had stood second to Jackson in the electoral vote, was chosen in preference to Jackson, Clay, and Crawford. The administration of Adams was marked by the imposition of a high tariff on foreign goods, with the view of promoting internal industry, and by the unsuccessful attempt to purchase Cuba from Spain. Notwithstanding the efforts of Clay, and the special claim he himself made on the voters of Virginia on account of his discovery of the so-called New England "plot" twenty years before, Adams failed to secure his re-election in 1829. Deceived by Jackson, who had 178 votes to his 83, he retired. Quincy, where his father's fortune, increased by his own efforts, afforded



him an ample competency. Two years later he was returned to Congress by the district in which he lived, and which he continued to represent until his death. Having been chosen merely on account of his determined resistance to secret societies, his position was independent of party politics, and correspondingly strong. He stood for the office of governor, and then for that of senator, of Massachusetts, but was on both occasions defeated by Davis. As chairman of the committee on manufactures, he strove to devise a middle policy in regard to tariffs, but his greatest effort at this period—perhaps the greatest service of his whole political life—was in connection with the abolition of slavery. In every form which the question took, he was the bold and determined advocate of abolition, gradually gathering an influential party around him, and so preparing for the triumphs, most of which have been won since his death. He himself witnessed, in 1845, the abolition of the "gag-rule," restricting the right of petition to Congress on the subject of slavery, which he had persistently opposed during the nine years it was in force. He died of paralysis on 23d February 1848, having been seized two days previously while attending the debates of Congress. Adams wrote a number of works, which are now of little importance. The style is fluent, but has none of the vigour and elegance of his father's. During his whole lifetime he kept a very voluminous journal, some portions of which have been published.

ADAMS, RICHARD, M.A., divine. Two contemporaries of the same name are frequently confounded with each other. The more eminent was son of the Rev. Richard Adams, rector of Worrall, in Cheshire. The family records seven clergymen of the Church of England in succession. The present worthy was born at Worrall, but the loss of the registers leaves the date uncertain. It is usually, but erroneously, stated that he studied at Cambridge University. He was admitted a student of Brasenose College, Oxford, March 24, 1646, and became a fellow, having proceeded through the usual degrees. It was at Brasenose he formed his life-long friendship with John Howe, who had a profound veneration for Adams. In 1655 he was appointed to the rectory of St Mildred's, Bread Street, London—John Milton being a parishioner. From this he was ejected by the Act of Uniformity of 1662. Thereupon he continued his ministry as opportunity offered, and at length was settled as pastor of a congregation in Southwark. This Richard Adams is a typical example of the consistent and meek labourers of the early and struggling period of Nonconformity. His holy and beautiful life inspired Howe's noblest eloquence in his funeral sermon. He died in a ripe old age, on 7th Feb. 1698. His principal literary work is his contribution of annotations on Philippians and Colossians to Pool's celebrated *Annotations*. Along with Veal he edited the works of Charnock. (A. B. G.)

ADAMS, SAMUEL, American statesman, born at Boston, Sept. 27, 1722, was second cousin to John Adams. He studied at Harvard, but, owing to his father's misfortunes in business in connection with a banking speculation,—the "manufactory scheme,"—he had to leave before completing his course, and to relinquish his intention of becoming a Congregational clergyman. He received his degree, however, and it is worthy of note, as showing the tendency of his political opinions, that his thesis was a defence of the affirmative reply to the question, "Whether it be lawful to resist the supreme magistrate, if the commonwealth cannot otherwise be preserved?" The failure of the banking scheme above referred to, in consequence of the limitations imposed by English law, made Adams still more decided in his assertion of the rights of American citizens, and in his opposition to Parliament. He gave up his business, in which he had little success, and became tax-

collector for the city of Boston, whence he was called by his political opponents, "Samuel the publican." In all the proceedings which issued at last in the declaration of independence Adams was a conspicuous actor. He took part in the numerous town meetings, drafted the protest which was sent up by Boston against the taxation scheme of Grenville (May 1764); and, being chosen next year a member of the general court of Massachusetts, soon became one of the leaders in debate. Upon his entry into the House he was appointed clerk, and had thus much influence in arranging the order of business and in drawing up papers. Attempts were more than once made by the English governor to win him over by the offer of a place, but Adams proved inflexible. His uncompromising resistance to the British Government continued; he was a prominent member of the continental Congress at Philadelphia, and was one of those who signed the Declaration of Independence in 1776. He was a member of the convention which settled the constitution of Massachusetts, and became president of its Senate. From 1789 to 1794 he was lieutenant-governor of the State, and governor from 1794 to 1797, retiring in the latter year partly on account of age, but partly also because the Federalists were then in the ascendant, and he himself was inclined to the Jefferson or Republican party. He died on the 3d Oct. 1803. In an oration on American independence, delivered in Philadelphia, 1st Aug. 1776, Adams characterises the English as "a nation of shopkeepers." The oration was translated into French, and published at Paris; and it is therefore not unlikely that Napoleon's use of this phrase was not original.

ADAMS, THOMAS—"the prose Shakespeare of Puritan theologians," as Southey named him—has left as few personal memorials behind him as the poet himself. The only facts regarding the commonplaces of his biography are furnished by epistles-dedictory and epistles to the reader, and title-pages. From these we learn that he was, in 1612, "a preacher of the gospel at Willington," in Bedfordshire, where he is found on to 1614, and whence issued his *Heaven and Earth Reconciled*, *The Devil's Banquet*, and other works; that in 1614-15 he was at Wingrave, in Buckinghamshire, probably as vicar, and whence a number of his works went forth in quick succession; that in 1618 he held the readership at St Gregory's, under St Paul's Cathedral, and was "observant chaplain" to Sir Henrie Montague, the Lord Chief-Justice of England; that during these years his epistles show him to have been on the most friendly terms with some of the foremost men in state and church; and that he must have died before the Restoration of 1660. His "occasionally" printed sermons, in small quartos, when collected in 1630, placed him beyond all comparison in the van of the preachers of England. Jeremy Taylor does not surpass him in brilliance of fancies, nor Thomas Fuller in wit. His numerous works display great learning, classical and patristic, and are unique in their abundance of stories, anecdotes, aphorisms, and puns. He was a Puritan in the church, in distinction from the Nonconformist Puritans, and is evangelically, not dry-doctrinally, Calvinistic in his theology. His works have been recently collected by Drs Joseph Angus and Thomas Smith (3 vols. 8vo, 1862). (A. B. G.)

ADAMSON, PATRICK, a Scottish prelate, Archbishop of St Andrews, was born in the year 1543, in the town of Perth, where he received the rudiments of his education. He afterwards studied philosophy, and took his degree of master of arts at the University of St Andrews. In 1564 he set out for Paris as tutor to the eldest son of Sir William Macgill. In the month of June of the same year, Mary Queen of Scots being delivered of a son, afterwards James VI. of Scotland and I. of England, Mr Adamson

wrote a Latin poem, in which he gave the prince the title of king of France and England. This proof of his loyalty involved him in difficulties. The French court was offended, and ordered him to be arrested; and he was confined for six months. He was released only through the intercession of Queen Mary and some of the principal nobility, who interested themselves in his behalf. As soon as he recovered his liberty, he retired with his pupil to Bourges. He was in this city during the massacre at Paris; and the same persecuting spirit prevailing among the Catholics at Bourges as at the metropolis, he lived concealed for seven months in a public-house, the aged master of which, in reward for his charity to heretics, was thrown from the roof, and had his brains dashed out. Whilst Mr Adamson lay thus in his sepulchre, as he called it, he wrote his Latin poetical version of the book of Job, and his tragedy of Herod in the same language. In the year 1573 he returned to Scotland, and, having entered into holy orders, became minister of Paisley. In the year 1575 he was appointed one of the commissioners, by the General Assembly, to settle the jurisdiction and policy of the church; and the following year he was named, with Mr David Lindsay, to report their proceedings to the Earl of Morton, then regent. About this time the earl appointed him one of his chaplains; and, on the death of Archbishop Douglas, promoted him to the archiepiscopal see of St Andrews. This gave rise to a protracted conflict with the Presbyterian party in the Assembly. Soon after his promotion, he published a catechism in Latin verse, dedicated to the king, a work highly approved even by his enemies, who nevertheless still continued to persecute him with great violence. In 1578 he submitted himself to the General Assembly, which procured him peace but for a very little time; for, the year following, fresh accusations were brought against him. A Provincial Synod was held at St Andrews in April 1586; the archbishop was here accused and excommunicated. He appealed to the king and the states, but this availed him little. At the next General Assembly, a paper being produced containing the archbishop's submission, he was absolved from the excommunication. In 1588 fresh accusations were brought against him. The year following he published the Lamentations of the prophet Jeremiah in Latin verse, which he dedicated to the king, complaining of his hard usage. Towards the end of the same year he published a translation of the Apocalypse in Latin verse, and a copy of Latin verses. The king was unmoved by his application, and granted the revenue of his see to the Duke of Lennox, so that the prelate and his family were literally reduced to the want of bread. During the remaining part of his unfortunate life he was supported by charitable contributions, and died in 1592. He had previously made a written recantation of his alleged errors in regard to Episcopacy, though the genuineness of this is doubted by Spottiswoode. (See Cunningham's *Church History of Scotland*, vol. i.) The character of this prelate has been variously represented, according to the sentiments of religion and politics which prevailed. But there is little doubt that he encouraged and supported, under the authority of the king, oppressive and injurious measures. The panegyric of the editor of his works, Mr Wilson, is extravagant and absurd. He says that "he was a miracle of nature, and rather seemed to be the immediate production of God Almighty than born of a woman."

ADANA, a city of Asia Minor, the capital of the province of the same name, on the right bank of the Sihun, about 30 miles from the sea, in N. lat. 37° 1', E. long. 35° 18'. It is built on the site of the ancient *Antiochia ad Sarum*. Its position, commanding the passage of the mountains to the north of Syria, rendered it important as a military station in the contest between the Egyptians and

the Turks in 1832. After the defeat of the Turkish army at Konieh, it was taken possession of by Ibrahim Pacha, and continued to be held by the Egyptians till the treaty of July 1840 restored it to the Porte. In the streets of the town there are numerous beautiful fountains, supplied with water from the river, which is here spanned by a stately bridge of fifteen arches, said to have been erected by Justinian. In winter the climate is mild and healthy, but in summer the heat is so great that the principal inhabitants betake themselves to various cool retreats in the neighbouring mountains. The adjoining plain of Adana is rich and fertile. The chief productions of the province are cotton, corn, sesame, and wool, which are largely exported. The population of the town is 20,000.

ADANSON, MICHEL, a celebrated French naturalist, descended from a Scottish family which had at the Revolution attached itself to the fortunes of the house of Stuart, was born the 7th of April 1727, at Aix, in Provence, where his father was in the service of M. de Vintimille, archbishop of that province. On the translation of this prelate to the archbishopric of Paris, about the year 1730, the elder Adanson repaired thither with his five children, who were all provided for by their father's patron. A small canonry fell to the lot of Michel, the revenue of which defrayed the expenses of his education at the college of Plessis. While there he was distinguished for great quickness of apprehension, strength of memory, and mental ardour; but his genius took no particular bent, until he received a microscope from the celebrated Tuberville Needham, who was struck with admiration of the talents and acquirements he displayed at a public examination. From that time to the last hour of his life he persevered with a zeal almost unexampled in the observation and study of nature. On leaving college, his youthful ardour was well employed in the cabinets of Reaumur and Bernard de Jussieu, as well as in the Jardin des Plantes. Such was his zeal, that he repeated the instructions of the professors to his less apt fellow-students; and before completing his nineteenth year he had actually described (for his own improvement) 4000 species of the three kingdoms of nature. In this way he soon exhausted the rich stores of accumulated knowledge in Europe; and having obtained a small appointment in the colony of Senegal, he resigned his canonry, and embarked on the 20th of December 1748 for Africa. Senegal, from the unhealthiness of its climate, was a *terra incognita* to naturalists; and this determined his choice of that country as a field for exploration. His ardour remained unabated during the five years of his residence in Africa. He collected and described, in greater or less detail, an immense number of animals and plants; collected specimens of every object of commerce; delineated maps of the country; made systematic meteorological and astronomical observations; and prepared grammars and dictionaries of the languages spoken on the banks of the Senegal. On his return to Paris in February 1754 he found himself without resources, but fortunately secured the patronage of M. de Bombarde, who encouraged him in the publication of the scientific results of his travels. In his *Histoire Naturelle du Sénégal* (Paris, 1757) he made use of a small portion of the materials at his disposal; and the work has a special interest from the essay on Shells, printed at the end of it, where Adanson proposed his *universal method*, a system of classification distinct from those of Buffon and Linnæus. He founded his classification of all organised beings on the consideration of each individual organ. As each organ gave birth to new relations, so he established a corresponding number of arbitrary arrangements. Those beings possessing the greatest number of similar organs were referred to one great division, and the relationship was considered more remote in pro-



portion to the dissimilarity of organs. The chief defect of this method consists in presupposing a knowledge of species and their organisation altogether beyond the existing stage of knowledge. It gives, however, distinct ideas of the degree of affinity subsisting between organised beings, independent of all physiological science. Until the appearance of this work, the Testacea had scarcely been made the subject of serious study. Adanson's methodical distribution, founded on not less than twenty of the partial classifications already alluded to, is decidedly superior to that of any of his predecessors. For the first time there was presented in this department of natural history, a classification of the animals themselves, and not merely of the shells which contain them. Like every first attempt, however, it had its imperfections, which arose chiefly from ignorance of the anatomical structure of the animals. It was owing to this that he omitted, in his arrangement of the *Mollusca*, all molluscous animals without shells. He abandoned his original plan of publishing his Senegal observations in eight volumes, and applied himself entirely to his *Familles des Plantes*, which he published in 1763. Here he developed the principle of arrangement above mentioned, which, in its adherence to natural botanical relations, was based on the system of Tournefort, and had been anticipated to some extent nearly a century before by Ray. The success of this work was hindered by its innovations in the use of terms, which were ridiculed by the defenders of the popular sexual system of Linnæus; but it did much to open the way for the establishment, by means principally of Jussieu's *Genera Plantarum* (1789), of the natural method of the classification of plants. In 1774 Adanson submitted to the consideration of the Academy of Sciences an immense work, containing what may be called the *universal application of his universal method*; for it extended to all known beings and substances. This work consisted of 27 large volumes of manuscript, employed in displaying the general relations of all these matters, and their distribution; 150 volumes more, occupied with the alphabetical arrangement of 40,000 species; a vocabulary, containing 200,000 words, with their explanations; and a number of detached memoirs, 40,000 figures, and 30,000 specimens of the three kingdoms of nature. The committee to which the inspection of this enormous mass was intrusted strongly recommended Adanson to separate and publish all that was peculiarly his own, leaving out what was merely compilation. He obstinately rejected this advice; and the huge work, at which he continued to labour, was never published. He had been elected a member of the Academy of Sciences in 1759, and he latterly subsisted on a small pension it had conferred on him. Of this he was deprived on the dissolution of the Academy by the Constituent Assembly, and was consequently reduced to such a depth of poverty as to be unable to appear before the French Institute when it invited him to take his place among its members. Government afterwards conferred upon him a pension sufficient to relieve the simple wants of the great naturalist. He died, after months of severe suffering, on the 3d of August 1806, requesting, as the only decoration of his grave, a garland of flowers gathered from the 58 families he had differentiated—"a touching though transitory image," says Cuvier, "of the more durable monument which he has erected to himself in his works." His zeal for science, his unwearied industry, and his talents as a philosophical observer, are conspicuous in all his writings. The serenity of his temper, and the unaffected goodness of his heart, endeared him to the few who knew him intimately. On his return from Africa in 1754, he laid before the French Indian Company a scheme for the settlement of a colony in Senegal, where articles of African produce might be cultivated by free negroes. His propositions were unheeded by his countrymen, and by a mis-

directed patriotism he refused to present them to the Abolitionists of England. A similar feeling led him to refuse to settle in Austria, Russia, or Spain, on the invitation of the sovereigns of those countries. His most important works are his *Natural History of Senegal* and his *Families of Plants*. He contributed a number of papers to the Memoirs of the Academy of Sciences, on the Ship-morm, the Baobab tree (the largest tree known, to which, in honour of Adanson, Linnæus gave the name *Adansonia digitata*), the origin of the varieties of cultivated plants, gum-producing trees, and the *Oscillatoria Adansonia*, an animal regarded by him as a spontaneously moving plant. Besides these essays, he contributed several valuable articles in natural history to the earlier part of the Supplement to the first *Encyclopédie*; and he is also the reputed author of an essay on the *Electricity of the Tourmaline* (Paris, 1757), which bears the name of the Duke of Noya Caraffa.

ADAPTATION, in *Biology*, is the process by which an organism or species of organisms becomes modified to suit the conditions of its life. Every change in a living organism involves adaptation; for in all cases life consists in a continuous adjustment of internal to external relations. The term is usually restricted, however, to imply such modifications as arise during the life of an individual, when an external change directly generates some change of function and structure. Thus, since the adjustments of organisms arise partly in direct response to causes acting on the individual, and partly in response to causes acting not directly on the individual but on the species as a whole, adaptation is to be regarded as the complement of natural selection. While natural selection acts primarily on the species, adaptation acts only indirectly, through the inheritance of modifications directly generated in the individual. All adaptation is limited, since an organ can only vary to a certain limited extent from its congenital structure. Adaptations are sometimes distinguished as *indirect* (for instance, by Haeckel, *Generelle Morphologie*, vol. ii.), which are directly generated in an organism, but only become apparent in its offspring. These form an important class, and seem to suggest that the phenomena of adaptation, thoroughly understood, would go far to explain all the difficult cases of so-called spontaneous variation.

ADDA, the ancient *Addua*, a river of Northern Italy, formed by the union of several small streams, near the town of Bormio, in the Rhetian Alps, flows westward through the Valtellina into the Lake of Como, near its northern extremity. Issuing from the Lecco arm of the lake, it crosses the plain of Lombardy, and finally, after a course of about 150 miles, joins the Po, 8 miles above Cremona. The Adda was formerly the boundary between the territories of Venice and Milan; and on its banks several important battles have been fought, notably that of Lodi, where Napoleon defeated the Austrians in 1796.

ADDER, the common viper (*Vipera communis*). The death adder (*Acanthopis tortor*) of Australia, and the puff adder (*Crotalus arietans*) of South Africa, are both highly poisonous.

ADDINGTON, HENRY, VISCOUNT SIDMOUTH, prime minister of England, eldest son of Dr Anthony Addington, was born at Reading on the 30th May 1767. He was educated at Winchester and at Brasenose College, Oxford. In 1784 he was called to the bar at Lincoln's Inn, but being elected about the same time member of Parliament for Devizes, he did not enter on legal practice. He was already on terms of intimacy with the younger Pitt, his father having been Lord Chatham's medical adviser (a circumstance that secured for young Addington the nickname in Parliament of "the Doctor"); and he attached himself, as was natural, to the party of the great commoner.

His fidelity to Pitt received a speedy and ample acknowledgment when he was elected, in May 1789, speaker of the House, in succession to Grenville. For a period of twelve years he discharged the duties of the chair to the general satisfaction of all parties, if with no very marked ability. In 1801, when Pitt resigned on the question of Catholic emancipation, Addington succeeded him in the offices of prime minister and chancellor of the exchequer. He was head of the party that had come to be known as "the king's friends," and took office, it is said, on the urgent personal solicitation of his majesty. The most memorable event of his brief administration was the negotiation of the peace of Amiens, which was concluded on terms that were considered very favourable. It proved, however, but a short-lived truce, the ambition of the First Consul necessitating a renewal of hostilities in May 1803. From this period Pitt assumed a critical attitude towards the ministry, and at length he joined Fox and the opposition in demanding more vigorous measures for the defence of the country. The result was that Addington was compelled to resign, and Pitt was restored to power in May 1804. Addington abstained from all factious opposition, and indeed gave a general support to the Government. In January 1805 he joined the cabinet as president of the council, accepting at the same time the dignity of a peerage, which he had previously declined. He resigned office, however, in July of the same year, in consequence of the share he took in the prosecution of Lord Melville having estranged him from Pitt. After the death of the latter in 1806, he became lord privy seal, and subsequently lord president in the cabinet of Fox and Grenville, but resigned office in 1807. He became a third time lord president under Mr Perceval in 1812, and in June of the same year received the seals of the Home Office under the administration of Lord Liverpool. He held this position for ten eventful years, during which he received his full share of the hostile criticism to which home secretaries are peculiarly exposed. His administration had the merit of being vigorous, fearless, and consistent; but it frequently occasioned great irritation, and all but provoked rebellion. The policy of repression which he pursued in regard to the reform meeting at Manchester in 1819, was not justifiable even according to the limited ideas of liberty prevalent at that time. Lord Sidmouth resigned office in 1822, retaining his seat in the cabinet, however, until 1824. He died on the 15th Feb. 1844, at the advanced age of 87. (*Life and Correspondence of Lord Sidmouth*, by Dean Pellew, 3 vols. 8vo, 1847; *Life of William Pitt* by Lord Stanhope, 4 vols. p. 8vo, 1867.)

ADDISON, JOSEPH, was the eldest son of Lancelot Addison, Dean of Lichfield, and was born at his father's rectory of Milston in Wiltshire, on the 1st day of May 1672. After having passed through several schools, the last of which was the Charter-house, he went to Oxford when he was about fifteen years old. He was first entered of Queen's College, but after two years was elected a scholar of Magdalen College, having, it is said, been recommended by his skill in Latin versification. He took his master's degree in 1693, and held a fellowship from 1699 till 1711.

The eleven years extending from 1693, or his twenty-first year, to 1704, when he was in his thirty-second, may be set down as the first stage of his life as a man of letters. During this period, embracing no profession, and not as yet entangled in official business, he was a student, an observer, and an author; and though the literary works which he then produced are not those on which his permanent celebrity rests, they gained for him in his own day a high reputation. He had at first intended to become a clergyman; but his talents having attracted the attention of leading statesmen belonging to the Whig party, he was

speedily diverted from his earlier views by the countenance which these men bestowed on him. His first patron (to whom he seems to have been introduced by Congreve) was Charles Montague, afterwards Earl of Halifax, who was himself a dabbler in literature, and a protector of literary men; and he became known afterwards to the accomplished and excellent Somers. While both of them were quite able to estimate justly his literary merits, they had regard mainly to the services which they believed him capable of rendering to the nation or the party; and accordingly they encouraged him to regulate his pursuits with a view to public and official employment. For a considerable time, however, he was left to his own resources, which cannot have been otherwise than scanty.

His first literary efforts were poetical. In 1693 a short poem of his, addressed to Dryden, was inserted in the third volume of that veteran writer's *Miscellanies*. The next volume of this collection contained his translation, in tolerable heroic couplets, of "all Virgil's *Fourth Georgic*, except the story of Aristæus." Two and a half books of Ovid were afterwards attempted; and to his years of early manhood belonged also his prose *Essay on Virgil's Georgics*, a performance which hardly deserved, either for its style or for its critical excellence, the compliment paid it by Dryden, in prefixing it to his own translation of the poem. The most ambitious of those poetical assay-pieces is the *Account of the Greatest English Poets*, dated April 1694, and addressed affectionately to Sacheverell, the poet's fellow-collegian, who afterwards became so notorious in the party-quarrels of the time. This piece, spirited both in language and in versification, is chiefly noticeable as showing that ignorance of old English poetry which was then universal. Addison next, in 1695, published one of those compositions, celebrating contemporary events, and lauding contemporary great men, on which, during the half-century that succeeded the Revolution, there was wasted so much of good writing and of fair poetical ability. His piece, not very meritorious even in its own class, was addressed "To the King," and commemorates the campaign which was distinguished by William's taking of Namur. Much better than the poem itself are the introductory verses to Somers, then lord keeper. This production, perhaps intended as a remembrancer to the writer's patrons, did not at once produce any obvious effect: and we are left in considerable uncertainty as to the manner in which about this time Addison contrived to support himself. He corresponded with Tonson the bookseller about projected works, one of these being a Translation of Herodotus. It was probably at some later time that he purposed compiling a Dictionary of the English Language. In 1699 a considerable collection of his Latin verses was published at Oxford, in the *Musa Anglicana*. These appear to have interested some foreign scholars; and several of them show curious symptoms of his characteristic humour.

In the same year, his patrons, either having still no office to spare for him, or desiring him to gain peculiarly high qualifications for diplomatic or other important business, provided for him temporarily by a grant, which, though bestowed on a man of great merit and promise, would not pass unquestioned in the present century. He obtained, on the recommendation of Lord Somers, a pension of £200 a year, designed (as Addison himself afterwards said in a memorial addressed to the crown) to enable him "to travel, and qualify himself to serve His Majesty." In the summer of 1699 he crossed into France, where, chiefly for the purpose of learning the language, he remained till the end of 1700; and after this he spent a year in Italy. In Switzerland, on his way home, he was stopped by receiving notice that he was to be appointed envoy to Prince Eugene, then engaged in the war in Italy. But his Whig friends



were already tottering in their places; and, in March 1702, the death of King William at once drove them from power and put an end to the pension. Indeed Addison asserted that he never received but one year's payment of it, and that all the other expenses of his travels were defrayed by himself. He was able, however, to visit a great part of Germany, and did not reach Holland till the spring of 1703. His prospects were now sufficiently gloomy: he entered into treaty, oftener than once, for an engagement as a travelling tutor; and the correspondence in one of these negotiations has been preserved. Tonson had recommended him as the best person to attend in this character the son of the Duke of Somerset, commonly called "The Proud." The duke, a profuse man in matters of pomp, was economical in questions of education. He wished Addison to name the salary he expected; this being declined, he announced, with great dignity, that he would give a hundred guineas a year; Addison accepted the munificent offer, saying, however, that he could not find his account in it otherwise than by relying on his Grace's future patronage; and his Grace immediately intimated that he would look out for some one else. Towards the end of 1703 Addison returned to England.

Works which he composed during his residence on the Continent were the earliest that showed him to have attained maturity of skill and genius. There is good reason for believing that his tragedy of *Cato*, whatever changes it may afterwards have suffered, was in great part written while he lived in France, that is, when he was about twenty-eight years of age. In the winter of 1701, amidst the stoppages and discomforts of a journey across the Mount Cenis, he composed, wholly or partly, his *Letter from Italy*, which is by far the best of his poems, if it is not rather the only one among them that at all justifies his claim to the poetical character. It contains some fine touches of description, and is animated by a noble tone of classical enthusiasm. While in Germany he wrote his *Dialogues on Medals*, which, however, were not published till after his death. These have much liveliness of style, and something of the gay humour which the author was afterwards to exhibit more strongly; but they show little either of antiquarian learning or of critical ingenuity. In tracing out parallels between passages of the Roman poets and figures or scenes which appear in ancient sculptures, Addison opened the easy course of inquiry which was afterwards prosecuted by Spence; and this, with the apparatus of spirited metrical translations from the classics, gave the work a likeness to his account of his travels. This account, entitled *Remarks on Several Parts of Italy*, &c., he sent home for publication before his own return. It wants altogether the interest of personal narrative: the author hardly ever appears. The task in which he chiefly busies himself is that of exhibiting the illustrations which the writings of the Latin poets, and the antiquities and scenery of Italy, mutually give and receive. Many of the landscapes are sketched with great liveliness, and there are not a few strokes of arch humour. The statistical information is very meagre; nor are there many observations on society; and politics are no further meddled with than to show the moderate liberality of the writer's own opinions.

With the year 1704 begins a second era in Addison's life, which extends to the summer of 1710, when his age was thirty-eight. This was the first term of his official career; and, though very barren of literary performance, it not only raised him from indigence, but settled definitively his position as a public man. His correspondence shows that, while on the Continent, he had been admitted to confidential intimacy by diplomatists and men of rank; immediately on his return he was enrolled in the Kitcat Club, and brought thus and otherwise into communication with the gentry of the

Whig party. Although all accounts agree in representing him as a shy man, he was at least saved from all risk of making himself disagreeable in society, by his unassuming manners, his extreme caution, and that sedulous desire to oblige, which his satirist Pope exaggerated into a positive fault. His knowledge and ability were esteemed so highly, as to confirm the expectations formerly entertained of his usefulness in public business; and the literary fame he had already acquired soon furnished an occasion for recommending him to public employment. Though the Whigs were out of office, the administration which succeeded them was, in all its earlier changes, of a complexion so mixed and uncertain, that the influence of their leaders was not entirely lost. Not long after Marlborough's great victory at Blenheim, it is said that Godolphin, the lord treasurer, expressed to Lord Halifax a desire to have the great duke's fame extended by a poetical tribute. Halifax seized the opportunity of recommending Addison as the fittest man for the duty; stipulating, we are told, that the service should not be unrewarded, and doubtless satisfying the minister that his protégé possessed other qualifications for office besides dexterity in framing heroic verse. *The Campaign*, the poem thus written to order, was received with extraordinary applause; and it is probably as good as any that ever was prompted by no more worthy inspiration. It has, indeed, neither the fiery spirit which Dryden threw into occasional pieces of the sort, nor the exquisite polish that would have been given by Pope, if he had stooped to make such uses of his genius; but many of the details are pleasing; and in the famous passage of the Angel, as well as in several others, there is even something of force and imagination.

The consideration covenanted for by the poet's friends was faithfully paid. A vacancy occurred by the death of another celebrated man, John Locke; and in November 1704, Addison was appointed one of the five commissioners of appeal in Excise. The duties of the place must have been as light for him as they had been for his predecessor; for he continued to hold it with all the appointments he subsequently received from the same ministry. But there is no reason for believing that he was more careless than other public servants in his time; and the charge of incompetency as a man of business, which has been brought so positively against him, cannot possibly be true as to this first period of his official career. Indeed, the specific allegations refer exclusively to the last years of his life; and, if he had not really shown practical ability in the period now in question, it is not easy to see how he, a man destitute alike of wealth, of social or fashionable liveliness, and of family interest, could have been promoted, for several years, from office to office, as he was, till the fall of the administration to which he was attached. In 1706 he became one of the under-secretaries of state, serving first under Hedges, who belonged to the Tory section of the Government, and afterwards under Lord Sunderland, Marlborough's son-in-law, and a zealous follower of Addison's early patron, Somers. The work of this office, however, like that of the commissionership, must often have admitted of performance by deputy. For in 1707, the Whigs having become stronger, Lord Halifax was sent on a mission to the Elector of Hanover; and, besides taking Vanbrugh the dramatist with him as king-at-arms, he selected Addison as his secretary. In 1708 he entered Parliament, sitting at first for Lostwithiel, but afterwards for Malmesbury, which, being six times elected, he represented from 1710 till his death. Here unquestionably he did fail. What part he may have taken in the details of business we are not informed; but he was always a silent member, unless it be true that he once attempted to speak and sat down in confusion. In 1709 Lord Wharton, the father of the notorious duke, having been named lord-lieutenant of Ireland, Addison became his

secretary, receiving also an appointment as keeper of records. This event happened only about a year and a half before the dismissal of the ministry; and the Irish secretary would seem to have transacted the business of his office chiefly in London. But there are letters showing him to have made himself acceptable to some of the best and most distinguished persons in Dublin; and he escaped without having any quarrel with Swift, his acquaintance with whom had begun some time before. In the literary history of Addison those seven years of official service are almost a blank, till we approach their close. He defended the Government in an anonymous pamphlet on *The Present State of the War*; he united compliments to the all-powerful Marlborough with indifferent attempts at lyrical poetry in his opera of *Rosamond*; and, besides furnishing a prologue to Steele's comedy of *The Tender Husband*, he perhaps gave some assistance in the composition of the play. Irish administration, however, allowed it would seem more leisure than might have been expected. During the last few months of his tenure of office Addison contributed largely to the *Tatler*. But his entrance on this new field does nearly coincide with the beginning of a new section in his history.

Even the coalition-ministry of Godolphin was too Whiggish for the taste of Queen Anne; and the Tories, the favourites of the court, gained, both in parliamentary power and in popularity out of doors, by a combination of lucky accidents, dexterous management, and divisions and double-dealing among their adversaries. The real failure of the prosecution of Addison's old friend Sacheverell, completed the ruin of the Whigs; and in August 1710 an entire revolution in the ministry had been completed. The Tory administration which succeeded kept its place till the queen's death in 1714, and Addison was thus left to devote four of the best years of his life, from his thirty-ninth year to his forty-third, to occupations less lucrative than those in which his time had recently been frittered away, but much more conducive to the extension of his own fame, and to the benefit of English literature. Although our information as to his pecuniary affairs is very scanty, we are entitled to believe that he was now independent of literary labour. He speaks, in an extant paper, of having had (but lost) property in the West Indies; and he is understood to have inherited several thousand pounds from a younger brother, who was governor of Madras. In 1711 he purchased, for £10,000, the estate of Bilton, near Rugby,—the place which afterwards became the residence of Mr Apperley, better known by his assumed name of "Nimrod."

During those four years he produced a few political writings. Soon after the fall of the ministry, he contributed five numbers to the *Whig Examiner*, a paper set up in opposition to the Tory periodical of the same name, which was then conducted by the poet Prior, and afterwards became the vehicle of Swift's most vehement invectives against the party he had once belonged to. These are certainly the most ill-natured of Addison's writings, but they are neither lively nor vigorous. There is more spirit in his allegorical pamphlet, the *Trial and Conviction of Count Tariff*.

But from the autumn of 1710 till the end of 1714 his principal employment was the composition of his celebrated Periodical Essays. The honour of inventing the plan of such compositions, as well as that of first carrying the idea into execution, belongs to Richard Steele, who had been a school-fellow of Addison at the Charter-house, continued to be on intimate terms with him afterwards, and attached himself with his characteristic ardour to the same political party. When, in April 1709, Steele published the first number of the *Tatler*, Addison was in Dublin, and knew nothing of the design. He is said to have detected his

friend's authorship only by recognising, in one of the early papers, a critical remark which he remembered having himself communicated to Steele. He began to furnish essays in a few weeks, assisted occasionally while he held office, and afterwards wrote oftener than Steele himself. He thus contributed in all, if his literary executor selected his contributions correctly, more than 60 of the 271 essays which the work contains. The *Tatler* exhibited, in more ways than one, symptoms of being an experiment. The projector, imitating the news-sheets in form, thought it prudent to give, in each number, news in addition to the essay; and there was a want, both of unity and of correct finishing, in the putting together of the literary materials. Addison's contributions, in particular, are in many places as lively as anything he ever wrote; and his style, in its more familiar moods at least, had been fully formed before he returned from the Continent. But, as compared with his later pieces, these are only what the painter's loose studies and sketches are to the landscapes which he afterwards constructs out of them. In his invention of incidents and characters, one thought after another is hastily used and hastily dismissed, as if he were putting his own powers to the test, or trying the effect of various kinds of objects on his readers; his most ambitious flights, in the shape of allegories and the like, are stiff and inanimate; and his favourite field of literary criticism is touched so slightly, as to show that he still wanted confidence in the taste and knowledge of the public.

The *Tatler* was dropped at the beginning of 1711, but only to be followed by the *Spectator*, which was begun on the 1st day of March, and appeared every week-day till the 6th day of December 1712. It had then completed the 555 numbers usually collected in its first seven volumes. Addison, now in London and unemployed, co-operated with Steele constantly from the very opening of the series; and the two, contributing almost equally, seem together to have written not very much less than five hundred of the papers. Emboldened by the success of their former adventure, they devoted their whole space to the essays. They relied, with a confidence which the extraordinary popularity of the work fully justified, on their power of exciting the interest of a wide audience by pictures and reflections drawn from a field which embraced the whole compass of ordinary life and ordinary knowledge, no kind of practical themes being positively excluded except such as were political, and all literary topics being held admissible, for which it seemed possible to command attention from persons of average taste and information. A seeming unity was given to the undertaking, and curiosity and interest awakened on behalf of the conductors, by the happy invention of the *Spectator's* Club, in which Steele is believed to have drawn all the characters. The figure of Sir Roger de Coverley, however, the best even in the opening group, is the only one that was afterwards elaborately depicted; and Addison was the author of all the papers in which his oddities and amabilities are so admirably delineated. To him, also, the *Spectator* owed a very large share of its highest excellences. His were many, and these the most natural and elegant, if not the most original, of its humorous sketches of human character and social eccentricities, its good-humoured satires on ridiculous features in manners, and on corrupt symptoms in public taste; these topics, however, making up a department in which Steele was fairly on a level with his more famous coadjutor. But Steele had neither learning, nor taste, nor critical acuteness sufficient to qualify him for enriching the series with such literary disquisitions as those which Addison insinuated so often into the lighter matter of his essays, and of which he gave an elaborate specimen in his celebrated and agreeable criticism on *Paradise Lost*. Still further beyond the powers of Steele were those speculations on the theory of literature and of the processes of



thought analogous to it, which, in the essays "On the Pleasures of the Imagination," Addison prosecuted, not, indeed, with much of philosophical depth, but with a sagacity and comprehensiveness which we shall undervalue much unless we remember how little of philosophy was to be found in any critical views previously propounded in England. To Addison, further, belong those essays which (most frequently introduced in regular alternation in the papers of Saturday) rise into the region of moral and religious meditation, and tread the elevated ground with a step so graceful as to allure the reader irresistibly to follow; sometimes, as in the "Walk through Westminster Abbey," enlivening solemn thought by gentle sportiveness; sometimes flowing on with an uninterrupted sedateness of didactic eloquence; and sometimes shrouding sacred truths in the veil of ingenious allegory, as in the majestic "Vision of Mirza." While, in a word, the *Spectator*, if Addison had not taken part in it, would probably have been as lively and humorous as it was, and not less popular in its own day, it would have wanted some of its strongest claims on the respect of posterity, by being at once lower in its moral tone, far less abundant in literary knowledge, and much less vigorous and expanded in thinking. In point of style, again, the two friends resemble each other so closely as to be hardly distinguishable, when both are dealing with familiar objects, and writing in a key not rising above that of conversation. But in the higher tones of thought and composition, Addison showed a mastery of language raising him very decisively, not above Steele only, but above all his contemporaries. Indeed, it may safely be said, that no one, in any age of our literature, has united, so strikingly as he did, the colloquial grace and ease which mark the style of an accomplished gentleman, with the power of soaring into a strain of expression nobly and eloquently dignified.

On the cessation of the *Spectator*, Steele set on foot the *Guardian*, which, started in March 1713, came to an end in October, with its 175th number. To this series Addison gave 53 papers, being a very frequent writer during the latter half of its progress. None of his essays here aim so high as the best of those in the *Spectator*; but he often exhibits both his cheerful and well-balanced humour, and his earnest desire to inculcate sound principles of literary judgment. In the last six months of the year 1714, the *Spectator* received its eighth and last volume; for which Steele appears not to have written at all, and Addison to have contributed 24 of the 80 papers. Most of these form, in the unbroken seriousness both of their topics and of their manner, a contrast to the majority of his essays in the earlier volumes; but several of them, both in this vein and in one less lofty, are among the best known, if not the finest, of all his essays. Such are the "Mountain of Miseries;" the antediluvian novel of "Shallum and Hilpa;" the "Reflections by Moonlight on the Divine Perfections."

In April 1713 Addison brought on the stage, very reluctantly, as we are assured, and can easily believe, his tragedy of *Cato*. Its success was dazzling; but this issue was mainly owing to the concern which the politicians took in the exhibition. The Whigs hailed it as a brilliant manifesto in favour of constitutional freedom. The Tories echoed the applause, to show themselves enemies of despotism, and professed to find in Julius Cæsar a parallel to the formidable Marlborough. Even with such extrinsic aid, and the advantage derived from the established fame of the author, *Cato* could never have been esteemed a good dramatic work, unless in an age in which dramatic power and insight were almost extinct. It is poor even in its poetical elements, and is redeemed only by the finely solemn tone of its moral reflections, and the singular refinement and equable smoothness of its diction.

The literary career of Addison might almost be held as

closed soon after the death of Queen Anne, which occurred in August 1714, when he had lately completed his 42d year. His own life extended only five years longer; and this closing portion of it offers little that is pleasing or instructive. We see him attaining the summit of his ambition, only to totter for a little and sink into an early grave. We are reminded of his more vigorous days by nothing but a few happy inventions interspersed in political pamphlets, and the gay fancy of a trifling poem on Kneller's portrait of George I.

The lord justices who, previously chosen secretly by the Elector of Hanover, assumed the government on the Queen's demise, were, as a matter of course, the leading Whigs. They appointed Addison to act as their secretary. He next held, for a very short time, his former office under the Irish lord-lieutenant; and, early in 1716, he was made one of the lords of trade. In the course of the same year occurred the first of the only two quarrels with friends, into which the prudent, good-tempered, and modest Addison is said to have ever been betrayed. His adversary on this occasion was Pope, who, only three years before, had received, with an appearance of humble thankfulness, Addison's friendly remarks on his *Essay on Criticism*; but who, though still very young, was already very famous, and beginning to show incessantly his literary jealousies, and his personal and party hatreds. Several little misunderstandings had paved the way for a breach, when, at the same time with the first volume of Pope's *Iliad*, there appeared a translation of the first book of the poem, bearing the name of Thomas Tickell. Tickell, in his preface, disclaimed all rivalry with Pope, and declared that he wished only to bespeak favourable attention for his contemplated version of the *Odyssey*. But the simultaneous publication was awkward; and Tickell, though not so good a versifier as Pope, was a dangerous rival, as being a good Greek scholar. Further, he was Addison's under-secretary and confidential friend; and Addison, cautious though he was, does appear to have said (quite truly) that Tickell's translation was more faithful than the other. Pope's anger could not be restrained. He wrote those famous lines in which he describes Addison under the name of Atticus; and, as if to make reconciliation impossible, he not only circulated these among his friends, but sent a copy to Addison himself. Afterwards, he went so far as to profess a belief that the rival translation was really Addison's own. It is pleasant to observe that, after the insult had been perpetrated, Addison was at the pains, in his *Freeholder*, to express hearty approbation of the *Iliad* of Pope; who, on the contrary, after Addison's death, deliberately printed the striking but malignant lines in the Epistle to Dr Arbuthnot. In 1716 there was acted, with little success, the comedy of *The Drummer, or the Haunted House*, which, though it appeared under the name of Steele, was certainly not his, and was probably written in whole or chiefly by Addison. It contributes very little to his fame. From September 1715 to June 1716, he defended the Hanoverian succession, and the proceedings of the Government in regard to the rebellion, in a paper called the *Freeholder*, which he wrote entirely himself, dropping it with the fifty-fifth number. It is much better tempered, not less spirited, and much more able in thinking, than his *Examiner*. The final man of taste does indeed show himself to be sometimes weary of discussing constitutional questions; but he aims many enlivening thrusts at weak points of social life and manners; and the character of the Fox-hunting Squire, who is introduced as the representative of the Jacobites, is drawn with so much humour and force that we regret not being allowed to see more of him.

In August 1716, when he had completed his 44th year,<sup>1</sup> Addison married the Countess-Dowager of Warwick, a

widow of fifteen years' standing. She seems to have forfeited her jointure by the marriage, and to have brought her husband nothing but the occupancy of Holland House at Kensington. We know hardly anything positively in regard to the affair, or as to the origin or duration of his acquaintance with the lady or her family. But the current assertion that the courtship was a long one is very probably erroneous. There are better grounds for believing the assertion, transmitted from Addison's own time, that the marriage was unhappy. The countess is said to have been proud as well as violent, and to have supposed that, in contracting the alliance, she conferred honour instead of receiving it. To the uneasiness caused by domestic discomfort, the most friendly critics of Addison's character have attributed those habits of intemperance, which are said to have grown on him in his later years to such an extent as to have broken his health and accelerated his death. His biographer, Miss Aikin, who disbelieves his alleged want of matrimonial quiet, has called in question, with much ingenuity, the whole story of his sottishness; and it must at any rate be allowed that all the assertions which tend to fix such charges on him in the earlier parts of his life, rest on no evidence that is worthy of credit, and are in themselves highly improbable. Sobriety was not the virtue of the day; and the constant frequenting of coffee-houses, which figures so often in the *Spectator* and elsewhere, and which was really practised among literary men as well as others, cannot have had good effects. Addison, however, really appears to have had no genuine relish for this mode of life; and there are curious notices, especially in Steele's correspondence, of his having lodgings out of town, to which he retired for study and composition. But, whatever the cause may have been, his health was shattered before he took that which was the last, and certainly the most unwise step, in his ascent to political power.

For a considerable time dissensions had existed in the ministry; and these came to a crisis in April 1717, when those who had been the real chiefs passed into the ranks of the opposition. Townshend was dismissed, and Walpole anticipated dismissal by resignation. There was now formed, under the leadership of General Stanhope and Lord Sunderland, an administration which, as resting on court-influence, was nicknamed the "German ministry." Sunderland, Addison's former superior, became one of the two principal secretaries of state; and Addison himself was appointed as the other. His elevation to such a post had been contemplated on the accession of George I., and prevented, we are told, by his own refusal; and it is asserted, on the authority of Pope, that his acceptance now was owing only to the influence of his wife. Even if there is no ground, as there probably is not, for the allegation of Addison's inefficiency in the details of business, his unfitness for such an office in such circumstances was undeniable and glaring. It was impossible that a Government, whose secretary of state could not open his lips in debate, should long face an opposition headed by Robert Walpole. The decay of Addison's health, too, was going on rapidly, being, we may readily conjecture, precipitated by anxiety, if no worse causes were at work. Ill health was the reason assigned for retirement, in the letter of resignation which he laid before the king in March 1718, eleven months after his appointment. He received a pension of £1500 a year.

Not long afterwards the divisions in the Whig party alienated him from his oldest friend. The Peerage Bill, introduced in February 1719, was attacked, on behalf of the opposition, in a weekly paper, which was called the *Plebeian*, and written by Steele. Addison answered it temperately enough in the *Old Whig*; provocation from the *Plebeian* brought forth angry retort from the *Whig*;

Steele charged Addison with being so old a Whig as to have forgotten his principles; and Addison sneered at Grub Street, and called his friend "Little Dicky."<sup>1</sup> How Addison felt after this painful quarrel we are not told directly; but the *Old Whig* was excluded from that posthumous collection of his works for which his executor Tickell had received from him authority and directions. In that collection was inserted a treatise on the evidences of the faith, entitled *Of the Christian Religion*. Its theological value is very small; but it is pleasant to regard it as the last effort of one who, amidst all weaknesses, was a man of real goodness as well as of eminent genius.

The disease under which Addison laboured appears to have been asthma. It became more violent after his retirement from office, and was now accompanied by dropsy. His deathbed was placid and resigned, and comforted by those religious hopes which he had so often suggested to others, and the value of which he is said, in an anecdote of doubtful authority, to have now inculcated in a parting interview with his stepson. He died at Holland House on the 17th day of June 1719, six weeks after having completed his 47th year. His body, after lying in state, was interred in the Poets' Corner of Westminster Abbey.

The *Biographia Britannica* gives an elaborate memoir of him; particulars are well collected in the article under his name in the *Biographical Dictionary of the Society for the Diffusion of Useful Knowledge*; and a good many new materials, especially letters, will be found in *The Life of Joseph Addison*, by Lucy Aikin, 1843. (w. s.)

An edition of Addison's works, in four volumes quarto, was published by Baskerville at Birmingham in 1761. Dibdin characterises this as a "glorious performance." A complete edition in six volumes, with notes, by Richard Hurd, appeared in 1811. An American edition (New York, 1854), in six volumes, with notes, by G. W. Greene, contains several pieces collected for the first time. An edition of the *Spectator*, with valuable notes by Henry Morley, appeared in 1871.

ADEL or SOMAULI, an extensive tract of country, stretching eastward from the neighbourhood of Tadjurrah to Cape Guardafui, between 43° and 51° E. long., with a breadth not accurately ascertained. Zeila and Berbera are the chief port on the coast, and have some trade with the opposite shores of Arabia, exporting spices, ivory, gold dust, cattle, and horses, and receiving Indian commodities in exchange. The country, which is marshy and unhealthy, is inhabited by the Somaui, who are governed by an Iman, and are Mahometans.

ADELAAR, COET SIVARTSEN, surnamed the Eagle, a famous naval commander, was born at Brevig in Norway in 1622. At the age of fifteen he became a cadet in the Dutch fleet under Van Tromp, and after a few years entered the service of the Venetian Republic, which was engaged at the time in a war with Turkey. In 1645 he had risen to the rank of captain; and after sharing in various victories as commander of a squadron, he achieved his most brilliant success at the Dardanelles, on the 13th May 1654, when, with his own vessel alone, he broke through a line of 37 Turkish ships, sank 15 of them, and burned others, causing a loss to the enemy of 5000 men. The following day he entered Tenedos, and compelled the complete surrender of the Turks. On returning to Venice he was crowned with honours, and became admiral-lieutenant in 1660. Numerous tempting offers were made to him by other naval powers, and in 1661 he left Venice to return to the Netherlands. Next year he was induced, by the offer of a title and an enormous salary, to accept the command of the Danish fleet from Frederick III. Under Christian V. he took the command of the combined Danish fleets against Sweden, but died suddenly (5th November

<sup>1</sup> On this point, however, see Macaulay's *Essay on The Life and Writings of Addison*.



1675) at Copenhagen, before the expedition set out. When in the Venetian service, Adelaar was known by the name of Curzio Suffrido Adelborst.

ADELAIDE, the capital of the British colony of South Australia and of the county of the same name, situated on the Torrens, seven miles from Port-Adelaide, with which it is connected by railway. The river, which is spanned at this point by several bridges, divides the city into two parts—North Adelaide, the smaller of the two, but containing the chief private houses, occupying a gentle slope on the right bank; and South Adelaide, the commercial centre of the town, lying on a very level plain on the left. The streets of Adelaide are broad, and regularly laid out. Among its public buildings are the Government offices and the governor's house, the post office, the jail, five banks, the railway station, and a theatre. It is the seat of a Protestant Episcopal and also of a Roman Catholic bishop, and contains places of worship belonging to these bodies, as well as to the Presbyterians, the Methodists, the Unitarians, the Baptists, and other denominations. Adelaide possesses a botanical garden, and is surrounded by extensive public grounds, known as the "Park Lands," containing over 1900 acres. It is lighted with gas, and is supplied with water from a reservoir some miles up the Torrens. The corporation consists of a mayor and eight councillors, two from each of the four wards; and there are also two auditors, a town clerk, and other officials. The chief manufactures are woollen, starch, soap, beer, flour, leather, earthenware, and iron goods. There is a good retail trade in European produce; and in the vicinity are iron and copper mines. Adelaide was founded in 1836, and incorporated in 1842. It received its name in honour of Queen Adelaide. Population, 27,208. Lat. 34° 55' S., long. 138° 38' E.

PORT ADELAIDE is situated in a low marshy position, on a small inlet of the Gulf of St Vincent. Its harbour is safe and commodious; but a bar at the mouth, where the depth of water varies with the tide from 8 to 16 feet, prevents large vessels from entering. It is a free port, and has good wharfs and warehouse accommodation. In 1867, 364 vessels of 119,654 tons arrived at, and 376 of 125,559 tons departed from, Port Adelaide. The chief imports were drapery, iron goods and machinery, beer, wine, spirits, and paper; and the exports, grain, copper and lead ores, wool, tallow, and other native products. Population, 2482.

ADELSBERG, a market town of Austria, in the province of Carniola, 26 miles SW. of Laibach, and about the same distance E. of Trieste. About a mile from the town is the entrance to the famous stalactite cavern of Adelsberg, the largest and most magnificent in Europe. The cavern is divided into four grottoes, with two lateral ramifications which reach to the distance of about a mile and a half from the entrance. The river Poik enters the cavern 60 feet below its mouth, and is heard murmuring in its recesses. In the Kaiser-Ferdinand grotto, the third of the chain, a great ball is annually held on Whitmonday, when the chamber is brilliantly illuminated. The Franz-Joseph-Elisabeth grotto, the largest of the four, and the farthest from the entrance, is 665 feet in length, 640 feet in breadth, and more than 100 feet high. Besides the imposing proportions of its chambers, the cavern is remarkable for the variegated beauty of its stalactite formations, some resembling transparent drapery, others waterfalls, trees, animals, or human beings, the more grotesque being called by various fanciful appellations. These subterranean wonders were known in the Middle Ages, but the cavern remained undiscovered in modern times until 1816, and it is only in still more recent times that its vast extent has been fully ascertained and explored.

ADELUNG, FRIEDRICH VON, a distinguished philologist, nephew of John Christoph Adelung, was born at

Stettin on the 25th February 1768. After studying philosophy and jurisprudence at Leipsic he accompanied a family to Italy, where he remained for several years. At Rome he obtained access to the Vatican library, a privilege which he utilised by collating and editing some valuable old German MSS. that had been taken from Heidelberg. On his return he became private secretary to Count Pahlen, whom he accompanied from Riga to St Petersburg. In 1803 he became instructor to the younger brothers of the Czar, the arch-dukes Nicholas and Michael, and gave such satisfaction to the empress-mother that she entrusted him with the care of her private library. In 1824 he became director of the Oriental Institute in connection with the foreign office, and, in the year following president of the Academy of Sciences. He died on the 30th January 1843. Adelung's chief literary works were—a *Biography of Baron Herberstein* (St Petersburg, 1817), a *Biography of Baron de Meyerberg* (1827), a treatise on the *Relations between the Sanscrit and the Russian Languages* (1815), and an *Essay on Sanscrit Literature* (1830), a second edition of which appeared in 1837, under the title *Bibliotheca Sanscrita*.

ADELUNG, JOHANN CHRISTOPH, a very eminent German grammarian, philologist, and general scholar, was born at Spantekow, in Pomerania, on the 8th August 1732, and educated at the public schools of Anclam and Klosterbergen, and the university of Halle. In the year 1759 he was appointed professor at the gymnasium of Erfurt, but relinquished this situation two years after, and went to reside in a private capacity at Leipsic, where he continued to devote himself for a long period to the cultivation of letters, and particularly to those extensive and laborious philological researches which proved so useful to the language and literature of his native country. In 1787 he received the appointment of principal librarian to the elector of Saxony at Dresden, with the honorary title of Aulic Counsellor. Here he continued to reside during the remainder of his life, discharging with diligence and integrity the duties of his situation, and prosecuting his laborious studies to the last with indefatigable industry and unabated zeal. Possessing a naturally robust constitution, he was able to devote, it has been said, fourteen hours daily to literary toil, down even to the period of his death. He died at Dresden on the 10th of September 1806. The life of a mere scholar is generally destitute of interest; and that of Adelung, which was spent entirely in literary seclusion, presents no variety of incident to the pen of the biographer. Of his private character and habits few memorials have been preserved, but in these few he is represented as the man of an amiable disposition. He was a lover of good cheer, and spared neither pains nor expense in procuring a variety of foreign wines, of which his cellar, which he facetiously denominated his *Bibliotheca Selectissima*, is said to have contained no less than forty different kinds. His manners were easy and affable, and the habitual cheerfulness of his disposition rendered his society most acceptable to a numerous circle of friends. The writings of Adelung are very voluminous, and there is not one of them, perhaps, which does not exhibit some proofs of the genius, industry, and erudition of the author. But although his pen was usefully employed upon a variety of subjects in different departments of literature and science, it is to his philological labours that he is principally indebted for his great reputation; and no man ever devoted himself with more zeal and assiduity, or with greater success, to the improvement of his native language. In a country subdivided into so many distinct sovereign states, possessing no common political centre, and no national institution whose authority could command deference in matters of taste,—in a country whose indigenous literature was but of recent growth, and where the dialect

of the people was held in contempt at the several courts, it was no easy task for a single writer to undertake to fix the standard of a language which had branched out into a variety of idioms, depending in a great measure upon principles altogether arbitrary. Adelung effected as much in this respect as could well be accomplished by the persevering labours of an individual. By means of his excellent grammars, dictionary, and various works on German style, he contributed greatly towards rectifying the orthography, refining the idiom, and fixing the standard of his native tongue.<sup>1</sup> Of all the different dialects he gave a decided preference to that of the margraviate of Misnia, in Upper Saxony, and positively rejected everything that was contrary to the phrasology in use among the best society of that province, and in the writings of those authors whom it had produced. In adopting this narrow principle he is generally thought to have been too fastidious. The dialect of Misnia was undoubtedly the richest, as it was the earliest cultivated of any in Germany; but Adelung probably went too far in restraining the language within the limits of this single idiom, to the exclusion of others from which it might have, and really has, acquired additional richness, flexibility, and force. His German dictionary has been generally regarded as superior to the English one of Johnson, and certainly far surpasses it in etymology. Indeed, the patient spirit of investigation which Adelung possessed in so remarkable a degree, together with his intimate knowledge of the ancient history and progressive revolutions of the different dialects on which the modern German is based, peculiarly qualified him for the duties of a lexicographer. No man before Jacob Grimm did so much for the language of Germany. Shortly before his death he issued the very learned work, at which he had been labouring quietly for years, entitled *Mithridates; or, a General History of Languages, with the Lord's Prayer, as a specimen, in nearly five hundred languages and dialects*. The hint of this work appears to have been taken from a publication, with a similar title, published by the celebrated Conrad Gesner in 1555; but the plan of Adelung is much more extensive. Unfortunately he did not live to finish what he had undertaken. The first volume, which contains the Asiatic languages, was published immediately after his death; the other three were issued under the superintendence of Professor Vater (1809-17). Of the very numerous works by Adelung, in addition to translations, the following are of greatest importance:—

*Geschichte der Streitigkeiten zwischen Dänemark und den Herzogen von Holstein-Gottorp*. Frankf., Leipzig, 1762, 4to.—*Pragmatische Staatsgeschichte Europas von dem Ableben Kaiser Karls des 6<sup>ten</sup> an*. Vols. 1-ix. Gotha, 1762-9, 4to.—*Mineralogische Bestatigungen*. Vols. 1-vi. Copenhagen and Leipzig, 1767-71, 8vo.—*Glossarium Manuale ad Scriptores medii et infimæ Latinitatis, ex magnis Glossariis Caroli du Fresne Domini Ducange et Carpentarii, in compendium redactum*. Tomi vi. Halle, 1772-84.—*Versuch eines vollständigen grammatisch-kritischen Wörterbuchs der Hoch Deutschen Mundart*. 1774-86, 6 vols. 4to.—*Ueber die Geschichte der Deutschen Sprache, über Deutsche Mundarten und Deutsche Sprachlehre*. Leipzig, 1781, 8vo.—*Ueber den Ursprung der Sprache und den Bau der Wörter*. Ibid. 1781, 8vo.—*Deutsche Sprachlehre, zum Gebrauch der Schulen in der Königl. Preuss. Landen*. Berlin, 1781.—*Lehrgebäude der Deutschen Sprache*.—*Versuch einer Geschichte der Kultur des Menschlichen Geschlechts*. 1782, 8vo.—*Beiträge zur Bürgerlichen Geschichte, zur Geschichte der Kultur, zur Naturgeschichte, Naturlehre, und dem Feldbau*. Leipzig, 1783, 8vo.—*Fortsetzung und Ergänzungen zu Christ. Gottl. Jöchers allgemeinem Gelehrten Lexico*. Leipzig, 1784, 2 vols. 4to.—*Ueber den Deutschen Styl*. Berlin, 1785, 3 vols. 8vo.—*Vollständige Anweisung zur Deutschen Orthographie*. Leipzig, 1786, 2 vols.—*Auszug aus dem Grammatisch-kritischen Wörterbuch der Hohen Deutschen Mundart*. Leipzig, 1793, 1 vol.; 1795, 2 vols. 8vo.—*Mithridates. oder Allgemeine Sprachenkunde*. 3 vols. Berlin, 1806-1812.

<sup>1</sup> The period in which High German as a written language approached nearest perfection is, according to him, the short interval between 1740 and 1760.

ADEN, a town and seaport of Yemen in Arabia, belonging to Britain, situated on a peninsula of the same name, 100 miles east of the strait of Bab-el-Mandeb. The peninsula of Aden consists chiefly of a mass of barren and desolate volcanic rocks, extending five miles from east to west, and three from its northern shore to Ras Sanailah or Cape Aden, its most southerly point; it is connected with the mainland by a neck of flat sandy ground only a few feet high; and its greatest elevation is Jebel Shamsahan, 1776 feet above the level of the sea. The town is built on the eastern coast, in what is probably the crater of an extinct volcano, and is surrounded by precipitous rocks that form an admirable natural defence. There are two harbours, an outer, facing the town, protected by the island of Sirah, but now partially choked with mud; and an inner, called Aden Back-bay, or, by the Arabs, Bander Tuwayyi, on the western side of the peninsula, which, at all periods of the year, admits vessels drawing less than 20 feet. On the whole, Aden is a healthy place, although it suffers considerably from the want of good water, and the heat is often very intense. From its admirable commercial and military position, Aden early became the chief entrepôt of the trade between Europe and Asia. It was known to the Romans as *Arabia Felix* and *Attanae*, and was captured by them, probably in the year 24 A.D. At the commencement of the 16th century it fell into the hands of the Portuguese, who, however, were expelled by the Turks in 1538. In the following century the Turks themselves relinquished their conquests in Yemen, and the Sultan of Senna established a supremacy over Aden, which was maintained until the year 1730, when the Sheikh of Lahej, throwing off his allegiance, founded a line of independent sultans. In 1837 a ship under British colours was wrecked near Aden, and the crew and passengers grievously maltreated by the Arabs. An explanation of the outrage being demanded by the Bombay Government, the Sultan undertook to make compensation for the plunder of the vessel, and also agreed to sell his town and port to the English. Captain Haines of the Indian navy was sent to complete these arrangements, but the Sultan's son, who now exercised the powers of government, refused to fulfil the promises that his father had made. A combined naval and military force was thereupon despatched, and the place was captured on the 16th January 1839. It became an outlying portion of the Presidency of Bombay. The withdrawal of the trade between Europe and the East, caused by the discovery of the passage round the Cape of Good Hope, and the misgovernment of the native rulers, had gradually reduced Aden to a state of comparative insignificance; but about the time of its capture by the British, the Red Sea route to India was re-opened, and commerce soon began to flow in its former channel. Aden was made a free port, and was chosen as one of the coaling stations of the Peninsular and Oriental Steamship Company; and at present its most valuable import is coal for the use of the steamers. It has, however, a considerable trade in the products of Arabia—coffee, gum, feathers, dyes, pearls, and ivory; and in return receives silk and cotton goods, grain, and provisions. In 1871-72 the value of its imports was £1,404,169; and of its exports, £885,919. In the same year 535 steamers (643,982 tons), 94 sailing vessels (90,516 tons), and 898 native craft visited the port. The town has been fortified and garrisoned by the British; and its magnificent water-tanks, which had been permitted to fall into ruins, have been partially restored. It contains nearly 30,000 inhabitants, as compared with less than 1000 in 1839. Lat. 12° 46' N.; long. 45° 10' E.

ADERNO, a city of Sicily, in the province of Catania, near the foot of Mount Etna, 17 miles N.W. of Catania. It is built on the site of the ancient *Adrianum*, portions of the massive walls of which are still visible, and numerous



Roman sepulchres have been found in the vicinity. The modern city has a clean appearance, but the situation is unhealthy. It is remarkable for the number of its convents and nunneries, and has several churches, the chief of which is supported by beautiful pillars of polished lava. On the river Simeto, near the town, there is a series of beautiful cascades. Population, 12,999.

**ADERSBACH ROCKS**, a remarkable group of isolated columnar rocks in a valley of the Riesengebirge, on the frontier of Bohemia and Prussian Silesia, 9 miles W.N.W. of Braunau. The mountain, for several miles, appears divided into detached masses by perpendicular gaps, varying in depth from 600 to 1200 feet. These masses are from a few feet to several hundred yards in diameter. The part called the labyrinth consists of smaller masses of columnar form, confusedly piled on one another, and rising to heights of from 100 to 200 feet. From their fantastic shapes the rocks have received various fanciful appellations. Some geologists have supposed that their remarkable structure is the result of subterranean commotion; but the generally-received opinion is, that the whole area had once been a tabular mass of sandstone of unequal hardness, and that the soft parts, which formed perpendicular seams, have been worn away by water and atmospheric changes, leaving the harder portions in their natural position. The recesses of this wild region frequently afforded a place of refuge to the distressed inhabitants of the district during the Thirty Years' War.

**ADHESION**, a term used to denote the physical force in virtue of which one body or substance remains attached to the surface of another with which it has been brought into contact. It is to be distinguished from *cohesion*, which is the mutual attraction that the particles of the same body exert on each other; and it differs from *chemical attraction* or *affinity*, since the properties of the substances it affects remain unchanged after it takes place. It is a force that the molecules of the adhering bodies exert on each other, and must not be confounded with a contact which is due to mere mechanical pressure, such as that which a piece of caoutchouc tubing exerts by its elasticity on a body that distends it. A very familiar instance of adhesion occurs in the wetting of solid bodies. It often, indeed generally, happens that, when a solid and a liquid touch each other, a film of the latter adheres to the former, and neither falls nor can be shaken off. This arises from the adhesion of the liquid to the solid being a stronger force than the cohesion of the particles of the liquid. It is also stronger than the force of gravitation; and the liquid can only be removed by being forcibly rubbed off, or by the process of evaporation. The force of adhesion may be determined by poising a plate of metal on a balance, and afterwards ascertaining what additional force will be required to detach it from the surface of a liquid. But this can only be done in the few cases in which the liquid does not wet the solid (otherwise the measurement would be that of the cohesive force of the liquid), and does not act on it chemically. The phenomena of **CAPILLARY ATTRACTION** (*q.v.*) depend on adhesion. Sometimes, when a solid and a liquid are brought into contact, the adhesive force overcomes the cohesion of the particles of the solid, so that it loses its solid form, and is dissolved or held in solution. Solid bodies, too, as well as liquids, adhere to solids. Smooth surfaces (of lead, for instance, or of dissimilar metals) will adhere; and if two plates of polished glass be laid together, it will scarcely be possible to separate them without breaking them. If the solids are pressed together, the adhesive force is generally greater; but it has been shown to be dependent to a very slight extent only on the pressure of the atmosphere. To a lower kind of adhesion, whereby one body is prevented

from moving smoothly on the surface of another, we give the name of *friction*. The force of this increases with pressure, which may be the effect of gravitation or the result of mechanical appliances. If it be desired that solids should adhere permanently, this is commonly effected by the intervention of other substances—the cements, mortars, and solders—in a liquid or viscid state, which, when they “set” or become solid, adhere closely to the bodies united by means of them. The principle of the processes of plating, gilding, &c., is similar to this. The adhesive force of cements, &c., is sometimes very great. The common experiment of splitting a thin sheet of paper into two is an illustration of it. The paper is pasted carefully between two pieces of cloth, which are pulled asunder after the paste has dried. The adhesion of the paste to the paper and to the cloth is so strong that the paper is thus separated into two sheets, which can easily be detached from the cloth by wetting it. Again, air and other gases adhere to solids. A dry needle, placed carefully on the surface of still water, will float, resting on a cushion of air; and when thermometers are filled with mercury, the liquid has to be boiled in them to expel the air that adheres to the glass.

**ADIAPHORISTS** (*ἀδιάφοροι*, *indifferent*), a name applied to Melancthon and his supporters in a controversy which arose out of the so-called *Leipsic Interim* (1548), and raged until 1555. In 1547 Charles V. had drawn up the *Augsburg Interim*, with a view to provide for the temporary government of the Church until a general council could be called. This gave great dissatisfaction both to the more advanced and to the more moderate reformers; and the object of Melancthon's *Leipsic Interim* was to reconcile all parties, if possible, by declaring that certain rites and observances of the Roman Catholic Church and the jurisdiction of the Roman Catholic bishops being *adiaphora* (things indifferent), might be lawfully recognised. On the other hand, the Catholics were required to accept the Protestant formula of the doctrine of justification, leaving out the words *sola fide*, which, it was said, might belong to the *adiaphora*. In the controversy that followed, Melancthon's chief opponent was his former colleague, Matth. Flacius, on whose removal from Wittenburg to Magdeburg the latter place became the head-quarters of the extreme Lutherans.

**ADIGE** (German, *Etsch*), the ancient *Athesis*, a large river of Italy, formed by several rivulets which rise in the Rhetian Alps, and unite near Glarus. After flowing eastward to the neighbourhood of Botzen, it receives the Eisach, and becomes navigable. It then turns to the south, and leaving the Tyrol, enters Lombardy 13 miles S. of Roveredo. After traversing Northern Italy in a course first southerly, but then easterly, it falls into the Adriatic at Porto-Fossone, a few miles N. of the Po. The most considerable towns on its banks are Trent and Roveredo in the Tyrol, and Verona and Legnago in Italy. It is navigable from the heart of the Tyrol to the sea, and has in Lombardy a breadth of 200 yards and a depth of from 10 to 16 feet, but the strength of the current renders its navigation very difficult, and lessens its value as a means of transit between Germany and Northern Italy. The Adige has a course of about 220 miles.

**ADIPOCERE** (from *adeps*, fat, and *cera*, wax), a substance into which animal matter is sometimes converted, deriving its name from the resemblance it bears to both fat and wax. When the Cemetery of the Innocents at Paris was removed in 1786–87, great masses of this substance were found where the coffins containing the dead bodies had been placed very closely together. At the bottom of the coffin, in these cases, there appeared, loosely enveloped in linen, a shapeless mass, of a dingy white colour,

flattened as though it had undergone great pressure. The whole body had been converted into this fatty matter, except the bones, which remained, but were extremely brittle. Fourcroy, who had observed the substance before, and had given it the name of adipocere, read a paper on the subject before the Academy of Sciences in 1789. Chemically, adipocere is found to consist principally of margarate of ammonia. A similar substance, found in peat, is known as *bog-butter*.

**ADIPOSE** (*adeps*, fat), a term in *Anatomy*, signifying fatty; as adipose tissue, adipose cell, &c.

**ADIRONDACK MOUNTAINS**, a group of mountains in the N. of the state of New York, North America, lying between Lakes Champlain and Ontario. They rise from an extensive plateau about 2000 feet above the level of the sea, and are chiefly of granite formation. Mount Marcy, the highest summit, has an altitude of 5337 feet, and others of the group are from 4000 to 5000 feet high. The two principal streams which take their rise in this region—the Hudson flowing south, and the Richelieu flowing northwards from Lake Champlain—afford abundant means of conveying from the mountains the valuable timber, chiefly pine, with which they are covered. Extensive deposits of magnetic iron ore, of great value, have been discovered; and a village, called Adirondack, has recently sprung up, where smelting is extensively prosecuted. Emerson, in his poem *Adirondacks*, has familiarised the literary world with the scenery of these mountains.

**ADIT** (from *adire*, to go to), a passage or door. The doors of porticoes in ancient theatres were called adits. In mines the name is given to a gallery or passage, nearly horizontal, by which water is carried off. Ores also are sometimes removed by the adit. Some works of this kind are of great magnitude. The great Cornish adit at Gwennap, near Falmouth, extends, with its branches, to from 30 to 40 miles in length, and drains a tract of 5500 acres.

**ADJUDICATION**, in *Scottish Law*, the name of that action by which a creditor attaches the heritable, i.e., the real, estate of his debtor, or his debtor's heir, in order to appropriate it to himself either in payment or security of his debt. The term is also applied to a proceeding of the same nature by which the holder of an heritable right, labouring under any defect in point of form, gets that defect supplied by decree of a court.

**ADJUDICATION** in *Bankruptcy*, in *English Law*, is equivalent to the Scotch award of sequestration.

**ADJUSTMENT**, in *Commerce*, the settlement of a loss incurred at sea on insured goods. If the policy be what is called an *open one*, and the loss of the goods be total, the insurer must pay for them at the value of prime cost, which includes not only the invoice price of the goods, but all duties paid, the premium of insurance, and all expenses incurred on them when put on board. If the policy be a *valued one*, and a total loss be incurred, then they are settled for at the valuation fixed at the time of the insurance, unless the insurers can prove that the insured had not a real interest in the goods, or that they were overvalued. In case of a partial loss, the value of the goods must be proved. (See *Arnould On Marine Insurance*.)

**ADJUTAGE**, a short tube or nozzle, inserted in an orifice, by means of which liquids flow from a vessel more freely.

**ADJUTANT**, a military officer whose duty it is to assist the commanding officer of a regiment or battalion. Every battalion of infantry, regiment of cavalry, and brigade of artillery, has an adjutant, who keeps the regimental books, records, and correspondence; acts as the commanding officer's representative in matters of regimental detail; superintends the drill of recruits; keeps the roster (i.e., register of order of service) for all duties; details the guards,

piquets, detachments, &c., that are furnished by the regiment; and is responsible for the receipt of the daily divisional or brigade order from the superior staff-officer, and the preparation and issue of regimental orders. The *Adjutant-General* is the staff-officer specially charged with all matters relating to the discipline and drill of the army.

**ADJUTANT**, the *Ciconia Argala*, or *Leptoptilos Argala*, a species of stork found in tropical India. It is of great size, sometimes six or even seven feet in height, the body and legs bearing nearly the same proportion as in the common stork. The bill is long and large; while the head, neck, and pouch are bare, or covered only with a few scattered



hairs. At the back of its neck there is a second pouch-like appendage, which the bird inflates during flight. The general colour of the body is an ashen gray above and white below. The adjutant is extremely voracious, and, feeding on offal, reptiles, and other vermin, acts the part of a scavenger. It is often to be seen in camps and parade-grounds; hence its name. A similar bird, which, however, has been differentiated as

*Ciconia Marabou*, occurs in different parts of Africa—*Marabou* being the native Senegal name. The brilliant white marabou feathers of commerce are the under feathers of the tail and wings of both species, but those of the *C. Argala* are the most valuable.

**ADJYGURH**, a town and fort of India, in the presidency of Bengal, 130 miles S.W. of Allahabad. The fort is situated on a very steep hill, more than 800 feet above the town; and contains the ruins of temples adorned with elaborately-carved sculptures. It was captured by the British in 1809. The town is a neatly-built place, but subject to malaria. Population, 5000.

**ADMINISTRATOR**, in *English Law*, he to whom the ordinary or judge of the ecclesiastical court, now the Court of Probate, acting in the queen's name, commits the administration of the goods of a person deceased, in default of an executor. The origin of administrators is derived from the civil law. Their establishment in England is owing to a statute made in the 31st year of Edward III. Till then no office of this kind was known besides that of executor; in default of whom, the ordinary had the disposal of goods of persons intestate, &c.

**ADMINISTRATOR**, in *Scottish Law*, a person legally empowered to act for another whom the law presumes incapable of acting for himself, as a father for a pupil child.

**ADMIRAL**, a great officer or magistrate, who has the government of a navy and the hearing of all maritime causes.

There can be little doubt of the Asiatic origin of the name given to this officer, which does not appear to have been known in the languages of Europe before the time of the Holy Wars. *Amir*, in Arabic, is a chief or commander of forces; it is the same word as the *ameer* of the peninsula of India (as *ameer al omrah*, the chief of lords or princes), and the *ameer* of the Turks, or Saracens, who had and still have their *emir* or *ameer*! *durea*, commander



of the sea, *amir'l asker durrea*, commander of the naval armament. The incorporation of the article with the noun appears, we believe, for the first time in the Annals of Eutychius, patriarch of Alexandria, in the 10th century, who calls the Caliph Omar *Amir'ol munimim*, i.e., *Imperator fidelium*. Spelman says, "In regno Saracenorum quatuor praetores statuit, qui *admiralli* vocabantur." The *d* is evidently superfluous, and is omitted by the French, who say *Amiral*. The Spanish write *Almirante*; the Portuguese the same. Milton would seem to have been aware of the origin of the word when he speaks of "the mast of some great ammiral." It is obvious, then, that the supposed derivations of *ἀμυρος* from the Greek, *amer* from the French, and *aen mereal* from the Saxon, are fanciful and unauthorised etymologies.

Anciently there were three or four admirals appointed for the English seas, all of them holding the office *durante beneplacito*, and each of them having particular limits under his charge and government, as admiral of the fleet of ships from the mouth of the Thames, northward, southward, or westward. Besides these, there were admirals of the Cinque Ports. We sometimes find that one person had been admiral of all the fleets—Sir John de Beauchamp, 34 Edw. III., being the first who held the post; but the title of *Admiralis Angliæ* does not occur till the reign of Henry IV., when the king's half-brother, Sir Thomas Beaufort (created Earl of Dorset 5th July 1411), a natural son of John of Gaunt, was made admiral of the fleet for life, and admiral of England, Ireland, and Aquitaine for life. It may be observed that there was a title above that of admiral of England, which was *locum tenens regis super mare*, the king's lieutenant-general of the sea. This title is first mentioned in the reign of Richard II. Before the use of the word *admiral* was known, the title of *custos maris* was made use of.

Of the rank of admiral there are three degrees—admiral, vice-admiral, rear-admiral. Each of these degrees formerly comprised three grades, distinguished by red, white, and blue flags—the red being the highest degree in each rank of admiral, vice-admiral, and rear-admiral.

It may be remarked that for nearly a century there was no admiral of the red squadron. According to a vulgar error, that flag had been taken from us by the Dutch in one of those arduous struggles for naval superiority which that nation was once able to maintain against the naval power of England. But the fact is, the red flag was laid aside on the union of the two crowns of England and Scotland, when the union flag was adopted in its place, and was usually hoisted by the admiral commanding in chief. The red flag was revived on the occasion of the promotion of naval officers in November 1805, in consequence of the memorable victory off Trafalgar. The three degrees of red, white, and blue flag-officers were abolished by order in council on 5th August 1864, and the white ensign was thenceforward adopted as the sole flag for the ships of the royal navy proper. Captains are now promoted to be rear-admirals, rear-admirals to be vice-admirals, and vice-admirals to be admirals *simpliciter*—the numbers of each rank being regulated by orders in council passed on and subsequently to 22d February 1870. (See NAVY.) For biographical information, see Campbell's *Lives of the British Admirals*, 8 vols. 8vo, 1817; O'Byrne's *Naval Biographical Dictionary*, 8vo, 1849.

ADMIRAL OF THE FLEET is a mere honorary distinction, which gives no command, but merely an increase of half-pay, his being £3, 7s. a day, and that of an admiral £2, 2s. The title has been sometimes conferred on the senior admiral on the list of naval officers, and was a short time held by the Duke of Clarence, afterwards William IV. In 1851 were appointed, for the first time, two admirals of the fleet,

Sir Thomas Byam Martin, G.C.B., and Sir George Cockburn, G.C.B., the last having been appointed for his long and highly-distinguished services. The number of admirals of the fleet now (1874) authorised to be borne is three. If the admiral of the fleet should happen to serve afloat, he is authorised to carry the union flag at the main-top-gallant-mast head, which was the case when the Duke of Clarence escorted Louis XVIII. across the Channel to take possession of the throne of France.

The comparative rank of flag-officers and officers in the army has been settled as follows, by His Majesty's order in council, in the reign of George IV. :—

The admiral and commander-in-chief of the fleet has the rank of a field-marshal in the army; admirals with flags at the main take rank with generals of horse and foot; vice-admirals with lieutenant-generals; rear-admirals with major-generals; commodores of the first and second class with broad pendants with brigadier-generals.

On the active list of admirals there were in 1873 three admirals of the fleet, thirteen admirals, fifteen vice-admirals, and twenty-five rear-admirals.

In addition to these, there were on the reserved list forty admirals and thirty-four vice-admirals; on the retired list forty-three admirals, fifty-five vice-admirals, and sixty-two rear-admirals. As to the numbers to be borne permanently on these lists, and the regulations according to which admirals are retired and reserved, under Mr Childers' retirement scheme, see NAVY.

ADMIRAL (THE LORD HIGH) OF ENGLAND, an ancient officer of high rank in the state, who not only is vested with the government of the navy, but who, long before any regular navy existed in England, presided over a sovereign court, with authority to hear and determine all causes relating to the sea, and to take cognizance of all offences committed thereon.

The period about which this officer first makes his appearance in the governments of European nations corroborates the supposition of the office having been adopted in imitation of the Mediterranean powers at the return of the Christian heroes from the Holy Wars. According to Morel, Florent de Varenne, in the year 1270, was the first admiral known in France; but by the most approved writers of that nation the title was unknown till, in 1284, Enguerrand de Coucy was constituted admiral. The first admiral by name that we know of in England was W. de Leybourne, who was appointed to that office by Edward I. in the year 1286, under the title of *Admiral de la mer du Roy d'Angleterre*. Mariana, in his *History of Spain*, says that Don Sancho, having resolved to make war on the barbarians (Moors), prepared a great fleet; and as the Genese were at that time very powerful by sea, and experienced and dexterous sailors, he sent to Genoa to invite, with great offers, Benito Zacharias into his service; that he accepted those offers, and brought with him twelve ships; that the king named him his admiral (*almirante*), and conferred on him the office for a limited time. This happened in the year 1284. Several Portuguese authors observe that their office of *almirante* was derived from the Genoese, who had it from the Sicilians, and these from the Saracens; and it appears from Souza's *Historia Genealogica da Casa Real*, that in 1322 Micer Manuel Picagow was invited from Genoa into Portugal, and appointed to the office of *almirante*, with a salary of 8000 pounds (*livras*) a year, and certain lands, &c., on condition that he should furnish on his part twenty men of Genoa, all experienced in sea affairs, and qualified to be *alcadís* (captains) and *arrates* (masters) of ships: all of which terms, *almirante*, *alcadís*, and *arrates*, are obviously of Arabic derivation.

Edward I., who began his reign in 1272, went to the Holy Land, and visited Sicily on his return. He must therefore have had an opportunity of informing himself concerning the military and naval science of the various countries bordering on the Mediterranean—an opportunity which so able and warlike a prince would not neglect, but whether the title and office of admiral existed in England before his time, as some are inclined to think, or whether W. de Leybourne was first created to that office in 1286, as before mentioned, we believe there is no authentic record to enable us to decide. Supposing him, however, to be the first, Edward may either have adopted the office and title from the Genoese, or the Sicilians, or the Spaniards, or the French; or even had it directly from the Saracens, against whom he had fought, and with whom he had afterwards much amicable intercourse. It would seem, however,

that the office was in Edward's time to some extent honorary; for that monarch, in 1307, orders the lord mayor of London, at his peril and without delay, to provide a good ship, well equipped, to carry his pavilions and tents; and in the same year another order is addressed to the *Viccomes Cantie* to provide for immediate passage across the seas *tot et tales pontes et clavis*, as the constable of Dover Castle should demand, without one word being mentioned of the admiral. (Rymer, vol. iii. p. 22.) It is to be observed, however, that at this time the royal fleets were made up of royal and private ships, and that the admiral would not be charged with the transport of such things as those mentioned unless the fleet was intended to co-operate with the land forces.

From the 34th Edward II. we have a regular and uninterrupted succession of admirals. In that year Edward Charles was appointed admiral of the north, from the mouth of the river Thames northward, and Gervase Allard admiral of the west, from the mouth of the Thames westward; and these two admirals of the north and the west were continued down to the 34th Edward III., when Sir John de Beauchamp, lord warden of the Cinque Ports, constable of the Tower of London and of the Castle of Dover, was constituted *High Admiral of England*. Nine years afterwards the office was again divided into north and west, and so continued until the 16th Richard II., when Richard, son of Alain, Earl of Arundel, was appointed Admiral of England. Two years after this it was again divided as before; and in the 15th year of the same reign, Edward, Earl of Rutland and Cork, afterwards Duke of Albemarle, was constituted *High Admiral of the North and West*; and after him the Marquis of Dorset and Earl of Somerset, son of John of Gaunt, Duke of Lancaster. Percy, Earl of Winchester, next succeeded to the same title, which once more was dropped in the 2d of Henry IV., and divided as before. Sir Thomas Beaufort was twice appointed by Henry IV. admiral of England; and on the accession of Henry V. he was reappointed by letters patent dated 3d June 1418. In the 14th Henry VI., John Holland, Duke of Exeter, was created admiral of England, Ireland, and Aquitaine for life; and in the third year of Edward VI., John Dudley, Earl of Warwick, was constituted high admiral of England, Ireland, Wales, Calais, Boulogne, the marches of the same, Normandy, Gascony, and Aquitaine, also captain-general of the navy and seas of the king, &c. In the 27th Elizabeth, Charles, Lord Howard, had all the aforesaid titles, with the addition of captain-general of the navy and seas of the said kingdoms.

On the 20th November 1632 the office of high admiral was for the first time put in commission, all the great officers of state being the commissioners. During the Commonwealth a committee of Parliament managed the affairs of the Admiralty. At the Restoration, in 1660, the Duke of York was constituted *Lord High Admiral of England*. The commission was revoked in 1673, and King Charles II. held the Admiralty in his own hands, and managed it by the great officers of his privy council till 1684, when the Duke of York was re-instated. Charles took this occasion of reserving for his own use all the droits and perquisites claimed by the lord high admiral.

Annexed is a list of lord high admirals and first lords of the Admiralty from the time of Charles the Second to the year 1874:—

#### FIRST LORDS OF THE ADMIRALTY FROM 1660.

|                                          | Date of Appointment. |
|------------------------------------------|----------------------|
| James Duke of York,*                     | June 6, 1660.        |
| King Charles the Second,                 | June 14, 1673.       |
| Prince Rupert,                           | July 9, 1673.        |
| Sir Henry Capell, Kt.,                   | May 14, 1679.        |
| Daniel Finch, Esq.,                      | Feb. 14, 1680.       |
| Daniel Lord Finch,                       | Jan. 20, 1681.       |
| Daniel Earl of Nottingham,               | April 17, 1684.      |
| James Duke of York (and as James II.),†  | May 17, 1684.        |
| Arthur Herbert, Esq.,                    | March 8, 1689.       |
| Thomas Earl of Pembroke and Montgomery,  | Jan. 20, 1690.       |
| Charles Lord Cornwallis,                 | March 10, 1692.      |
| Anthony Viscount Falkland,               | April 16, 1693.      |
| Edward Russell, Esq.,                    | May 2, 1694.         |
| Edward Earl of Orford,                   | June 5, 1697.        |
| John Earl of Bridgewater,                | May 31, 1699.        |
| Thomas Earl of Pembroke and Montgomery,  | April 4, 1701.       |
| George Prince of Denmark,‡               | May 20, 1702.        |
| Thomas Earl of Pembroke and Montgomery,‡ | Nov. 29, 1708.       |
| Edward Earl of Orford,                   | Nov. 8, 1709.        |
| Sir John Leake, Kt.,                     | Oct. 4, 1710.        |
| Thomas Earl of Strafford,                | Sept. 30, 1712.      |
| Edward Earl of Orford,                   | Oct. 14, 1714.       |
| James Earl of Berkeley,                  | March 19, 1717.      |
| Lord Viscount Torrington,                | Aug. 2, 1727.        |

|                                                             | Date of Appointment. |
|-------------------------------------------------------------|----------------------|
| Sir Charles Wager, Kt.,                                     | June 21, 1733.       |
| Daniel Earl of Winchelsea and Nottingham,                   | March 10, 1741.      |
| John Duke of Bedford,                                       | Dec. 27, 1744.       |
| John Earl of Sandwich,                                      | Feb. 16, 1748.       |
| George Lord Anson,                                          | June 22, 1761.       |
| Richard Earl Temple,                                        | Nov. 17, 1756.       |
| Daniel Earl of Winchelsea and Nottingham,                   | April 6, 1767.       |
| George Lord Anson,                                          | July 2, 1767.        |
| George Duke Earl of Halifax,                                | June 17, 1762.       |
| George Grenville, Esq.,                                     | Oct. 18, 1762.       |
| John Earl of Sandwich,                                      | April 20, 1763.      |
| John Earl of Egmont,                                        | Sept. 13, 1763.      |
| Sir Charles Saunders, K.B.,                                 | Sept. 16, 1766.      |
| Sir Edward Hawke, K.B.,                                     | Dec. 11, 1766.       |
| John Earl of Sandwich,                                      | Jan. 12, 1771.       |
| Hon. Augustus Keppel,                                       | April 1, 1782.       |
| Augustus Viscount Keppel,                                   | July 18, 1782.       |
| Richard Viscount Howe,                                      | Jan. 30, 1783.       |
| Augustus Viscount Keppel,                                   | April 10, 1783.      |
| Richard Viscount Howe,                                      | Dec. 31, 1783.       |
| John Earl of Chatham,                                       | July 16, 1788.       |
| George John Earl Spencer,                                   | Dec. 19, 1794.       |
| John Earl of St Vincent, K.B.,                              | Feb. 19, 1801.       |
| Henry Lord Viscount Melville,                               | May 16, 1804.        |
| Charles Lord Bartram,                                       | May 2, 1805.         |
| Charles Grey, Esq.,                                         | Feb. 10, 1806.       |
| Thomas Grenville, Esq.,                                     | Sept. 29, 1806.      |
| Henry Lord Mulgrave,                                        | April 6, 1807.       |
| Right Hon. Charles Yorke,                                   | Nov. 24, 1809.       |
| Right Hon. Robert Viscount Melville,                        | March 25, 1812.      |
| H. R. H. William Henry Duke of Clarence,†                   | May 2, 1827.         |
| Right Hon. Robert Viscount Melville, K.T.,                  | Sept. 19, 1828.      |
| Right Hon. Sir James R. G. Graham, Bart.,                   | Nov. 25, 1830.       |
| Right Hon. George Baron Auckland,                           | June 11, 1834.       |
| Thomas Philip Earl de Grey,                                 | Dec. 28, 1834.       |
| Right Hon. George Baron Auckland,                           | April 26, 1835.      |
| Gilbert Earl of Minto, G.C.B.,                              | Sept. 19, 1835.      |
| Thomas Earl of Haddington,                                  | Sept. 8, 1841.       |
| Right Hon. Edward Earl of Ellenborough,                     | Jan. 18, 1846.       |
| Right Hon. George Earl of Auckland (died 1st January 1849), | July 24, 1846.       |
| Right Hon. Sir Francis T. Baring, Bart.,                    | Jan. 18, 1849.       |
| Algernon Percy Duke of Northumberland, K.G.,                | Feb. 28, 1852.       |
| Right Hon. Sir James R. G. Graham, Bart.,                   | Jan. 5, 1853.        |
| Right Hon. Sir Charles Wood, Bart.,                         | March 8, 1855.       |
| Right Hon. Sir John Pakington, Bart.,                       | March 9, 1858.       |
| Edward A. St Maur Duke of Somerset, K.G.,                   | June 28, 1859.       |
| Right Hon. Sir J. S. Pakington, Bart., G.C.B.,              | July 13, 1866.       |
| Right Hon. Henry Thomas Lowry Corry,                        | March 8, 1867.       |
| Right Hon. Hugh Culling Eardley Childers,                   | Dec. 18, 1868.       |
| Right Hon. George Joachim Goschen,                          | March 13, 1871.      |

\* Lord High Admiral of England.

† Lord High Admiral and Lord General.

‡ Lord High Admirals of Great Britain.

Prince George of Denmark, when lord high admiral, having surrendered, by a formal instrument, all the rights, profits, perquisites, and advantages whatsoever, appertaining to the office, for the benefit and use of the public, with the exception of the sum of £2500 a-year to be disposed of in such manner and for such particular uses as her Majesty, under her sign manual, should direct; and the salary of the lord high admiral, which had hitherto been no more than 300 marks, was now fixed, by warrant under privy seal, at £7000 a-year. This sum, by 1st George II., was divided equally among seven commissioners, an arrangement which continued from that time, except that the pay of the commissioner who stood first in the patent was made up from other funds to £3000 a-year, and in the year 1806 was further increased to £5000 a-year. Since the surrender above mentioned, all the *droits of admiralty*, as they are called, with all the fees, emoluments, and perquisites whatsoever, have been taken from the admiral and applied to public purposes.

These droits and perquisites are by no means inconsiderable. As enumerated in the patent, they consist of *lotsam*, *jetsam*, *ligan*, *treasure*, *deodands*, *derelicts*, found within the admiral's jurisdiction; all goods picked up at sea; all fines, forfeitures, ransoms, recognisances, and pecuniary punishments; all sturgeons, whales, porpoises, dolphins, and



grampuses and all such large fishes; all ships and goods of the enemy coming into any creek, road, or port, by stress of weather, mistake, or ignorance of the war; all ships seized at sea, salvage, &c., together with his shares of prizes; which shares were afterwards called *tenth*s, in imitation probably of the French, who gave their admiral, for supporting the dignity of his office, *son droit de dixième*. All prizes are now wholly given up by the crown to the captors, and such share of the *droits* as from circumstances may be thought proper. The lord high admiral also claimed and enjoyed as his due the cast ships; and the subordinate officers of the navy, as their perquisites, all other decayed and unserviceable stores.

Though by Act of 2 William and Mary, stat. 2, c. 2 (extended by the 1 Geo. IV. c. 90, and 7 and 8 Geo. IV. c. 65), the lords commissioners of the admiralty are vested with all and singular authorities, jurisdictions, and powers which have been and are vested, settled, and placed in the lord high admiral of England for the time being, to all intents and purposes as if the said commissioners were lord high admiral of England, yet there is this remarkable difference in the two patents by which they are constituted, that the patent of the lord high admiral mentions very little of the military part of his office, but chiefly details his judicial duties as a magistrate; whilst, on the contrary, the patent to the lords commissioners of the admiralty is very particular in directing them to govern the affairs of the navy, and is almost wholly silent as to their judicial powers.

These powers, as set forth in the patent to the Earl of Pembroke in 1701, are, the power to act by deputy; to take cognisance of all causes, civil and maritime, within his jurisdiction; to arrest goods and persons; to preserve public streams, ports, rivers, fresh waters, and creeks whatsoever within his jurisdiction, as well for the preservation of the ships as of the fishes; to reform too strait nets and unlawful engines, and punish offenders; to arrest ships, mariners, pilots, masters, gunners, bombardiers, and any other persons whatsoever able and fit for the service of the ships, as often as occasion shall require, and wheresoever they shall be met with; to appoint vice-admirals, judges, and other officers, *durante beneplacito*; to remove, suspend, or expel them, and put others in their places, as he shall see occasion; to take cognisance of civil and maritime laws, and of death, murder, and mayhem.

It was by no means necessary that the lord high admiral should be a professional man. Henry VIII. made his natural son, the Duke of Richmond, lord high admiral of England when he was but six years old. When the high admiral, however, went to sea in person, he had usually a commission under the great seal appointing him admiral and captain-general of the fleet, sometimes with powers to confer knighthood, and generally to punish with life and limb. Such a commission was granted by Henry VIII. to Sir Edward Howard, who executed indenture with the king to furnish 3000 men, 18 captains, 1750 soldiers, 1232 mariner and gunners; his own pay to be 10s. and that of a captain 1s. 6d. a-day. The rest had 5s. per mensum as wages, and 5s. for victuals each man together with certain dead shares.

It appears, from Mr Peppys' *Naval Collections*, that the lord high admiral did anciently wear, on solemn occasions, a gold whistle, set with precious stones hanging at the end of a gold chain.

The salary of the first lord commissioner is £4500 a-year, and of each of the naval lords £1500; in addition to the half-pay of their rank. The civil lord gets £1000. and the parliamentary secretary £2000 a-year.

The opening paragraph of the *Black Book of the Admiralty* has the following noteworthy instruction as regards the duties and officers to be chosen by the lord high admiral:—

"When one is made admiral, hee must first ordaine and substitute for his lieutenants, deputies, and other officers under him; some of the most loyall, wise, and discrete persons in the maritime law and auncient customes of the seas which hee can any where find, to the end that by the helpe of God and their good and just government, the office may be executed to the honour and good of the realme."

Had this precept been always acted on, there would probably have been less occasion than has presented itself for the many reorganisations which the administration of the lord high admiral's administrative office has undergone. As it has been, the necessity for periodical changes has been urgent and unavoidable. From the time of which Macaulay wrote, that the king (James II.) was the only honest man in his dockyards, down to the present date, the need has been incumbent on successive first lords and high admirals to lay the axe to the root of a tree which, in some shape or other, has not ceased to bring forth evil fruit. The soil favoured corruption, and no efficient means were employed to prevent its growth. A root and branch reformation was urgently needed, though it was not applied except in particular instances. Till the great French war of 1793–1815 led to the formation of a navy board of commissioners to superintend the work and management of the dockyards; of a victualling board, to see to the provisioning of the fleet; and of sick and hurt commissioners, to look after the sick and wounded—the administrative departments of the navy were left to nominees of the lord high admiral or first lord, the said nominees deriving "no small advantage" from the arrangement. Under the departmental boards things certainly improved from what they were in the time of Charles II.; but they fell far short of what was desirable, and, by the vagueness of their administrative principle, opened a door for irresponsible wrongdoing, which in the end made them exceedingly bad instruments of government. These boards continued till 1832, when Sir James Graham, then first lord of the admiralty, introduced sweeping changes. He abolished the several intangible boards which administered under the shelter of the board of admiralty, and appointed in their stead five principal officers of the navy, who were afterwards included in the admiralty patent. These officers were—a surveyor or architect and constructor of the navy; a storekeeper-general, charged with oversight and purchase of the material for dockyards and ships; an accountant-general, charged with the duty of seeing that all wages and cash paid were duly brought to account; a comptroller of victualling and transport services, charged with the maintenance of the victualling establishments of the navy, and of sufficient supplies of provisions and clothing for the fleet, and with the oversight of the transport arrangements for men and stores; and a physician of the navy, afterwards called medical director-general, charged with the oversight of all hospitals and of all sanitary arrangements of the navy. Each of these officers administered the department entrusted to him in every particular, not only in respect of stock, but of replenishment and account of stock. A lord of the admiralty was told off to supervise the permanent head and to represent his department at the board. These alterations were in many respects very beneficial. Altered circumstances required some modification of the original scheme of duties; and the addition of three principal officers—the director of works, the director of transports (who, after the Crimean war, relieved the comptroller of victualling of his transport duties), and the registrar of contracts. In 1860 the office of surveyor of the navy was abolished, and that of controller of the navy, with larger powers over dockyard management, was revived. In 1869, Mr Childers, first lord of the admiralty, made changes which tended

to subordinate the members of the board of admiralty more effectually to the first lord, constituting him in effect minister of marine; and to render departmental officers at once more individually responsible and more intimate with the controlling members of the board. He increased the power and functions of the controller of the navy, giving him a seat at the board, and charging him with the stock-keeping attributes of the storekeeper-general, whose purchasing functions were transferred to a new officer—the superintendent of contracts, the head of the contract and purchase department, and his accounting functions to the accountant-general. The office of storekeeper-general was abolished. The office of comptroller of victualling was also abolished—the storekeeping functions being transferred to a new officer, the superintendent of victualling—the purchasing function to the head of the purchase department, the accounts to the accountant-general. The other officers remained; but in the case of each this modification of business ensued, viz., that all stores whatever required by any of them were to be obtained through the agency of one supply or purchase department; that all accounts whatever were to be rendered to the accountant-general. The departmental officers of the admiralty at the present time (1874) are—the controller of the navy, without a seat at the board (who has on his staff a chief naval architect, a chief engineer, a surveyor of dockyards, a superintendent of naval stores, and a director of ordnance)—the director-general of the medical department, the director of works, the director of transports, the hydrographer, the superintendent of contracts, the superintendent of victualling. The department of the two permanent secretaries of the admiralty (one a naval officer, the other a civilian) undertakes the conduct of all business relating to the *personnel* of the navy and the ordering of the fleets.

To control the departmental officers, and to advise the responsible first lord, there are the following members of the board of admiralty, viz., the parliamentary or financial secretary, who has oversight of all business relating to finance, estimates, expenditure, and accounts, and who is the *alter ego* of the first lord in Parliament; the first naval lord, who, assisted by two other naval "lords," takes oversight of the *personnel* and of all executive functions of the fleet; and a civilian lord, who assists the financial secretary, and has particular oversight also of naval civil establishments and of the works department.

A list of secretaries of the admiralty from 1684 to the present time is given below:—

#### FIRST SECRETARIES TO THE ADMIRALTY.

|                                                         | From           | To              |
|---------------------------------------------------------|----------------|-----------------|
| Samuel Poppys, Esq., . . . . .                          | May 1684       | Feb. 1689.      |
| Phineas Bowles, Esq., . . . . .                         | March 1689     | Dec. 1689.      |
| James Sothorne, Esq., . . . . .                         | Dec. 25, 1689  | Sept. 24, 1694. |
| Josiah Barchett, Esq., . . . . .                        | Sept. 25, 1694 | Oct. 10, 1741.  |
| Thomas Corbet, Esq., . . . . .                          | Oct. 10, 1741  | ...             |
| John Cleveland, Esq., . . . . .                         | ...            | ...             |
| Philip Stevens, Esq. (then one of the Board), . . . . . | June 18, 1763  | March 3, 1795.  |
| Evan Nepean, Esq., . . . . .                            | March 3, 1795  | Jan. 21, 1804.  |
| William Marsden, Esq., . . . . .                        | Jan. 21, 1804  | June 24, 1807.  |
| Hon. W. W. Pole, . . . . .                              | June 24, 1807  | Oct. 8, 1809.   |
| John Wilson Croker, Esq., . . . . .                     | Oct. 8, 1809   | Nov. 29, 1830.  |
| Captain the Hon. George Elliott, . . . . .              | Nov. 29, 1830  | Dec. 24, 1834.  |
| Right Hon. George R. Dawson, . . . . .                  | Dec. 24, 1834  | Apr. 27, 1835.  |
| Charles Wood, Esq., M.P., . . . . .                     | Apr. 27, 1835  | Oct. 4, 1839.   |
| R. More O'Ferrall, Esq., . . . . .                      | Oct. 4, 1839   | June 9, 1841.   |
| John Parker, Esq., M.P., . . . . .                      | June 9, 1841   | Sept. 10, 1841. |
| Hon. Sidney Herbert, . . . . .                          | Sept. 10, 1841 | Feb. 1845.      |
| Right Hon. H. T. L. Corry, M.P., . . . . .              | Feb. 1845      | July 13, 1846.  |
| Henry G. Ward, Esq., M.P., . . . . .                    | July 13, 1846  | May 1, 1849.    |
| John Parker, Esq., M.P., . . . . .                      | May 1, 1849    | March 3, 1852.  |
| Augustus Stafford, Esq., . . . . .                      | March 3, 1852  | Jan. 6, 1853.   |
| Bernal Osborne, Esq., M.P., . . . . .                   | Jan. 6, 1853   | March 8, 1858.  |
| Right Hon. H. T. L. Corry, M.P., . . . . .              | March 9, 1858  | June 30, 1859.  |

|                                                      | From           | To              |
|------------------------------------------------------|----------------|-----------------|
| Rear-Admiral Lord C. G. Paget, C.B., M.P., . . . . . | June 30, 1859  | April 29, 1866. |
| Hon. Thomas G. Baring, M.P., . . . . .               | April 30, 1866 | July 15, 1866.  |
| Lord Henry G. Lennox, M.P., . . . . .                | July 16, 1866  | Dec. 17, 1868.  |
| W. E. Baxter, Esq., M.P., . . . . .                  | Dec. 18, 1868  | March 16, 1871. |
| Geo. J. Shaw Lefevre, Esq., M.P., . . . . .          | March 17, 1871 | ...             |

As regards the navies of foreign countries, their government is in the hands of ministers or departments variously constituted. The Russian Admiralty is a highly-organised bureau, divided into departments after the English manner, and under the supreme control of a high admiral, usually a Grand Duke of the Imperial House. The German Admiralty was, till 1872, a branch of the War Office, though governed by a vice-admiral under a naval prince of the reigning family. In 1872 it was severed from the War Office, though remaining an appanage thereof, and a general of the army was placed at its head. The French minister of marine, assisted by a permanent staff, controls the navy of France on a highly centralised system of administration; but the departments are well organised, and work well. The Italian fleet is governed on principles analogous to the French, but with a large admixture of the English representative element. The American navy is governed by a secretary of the navy, a cabinet minister, to whom the departmental heads are responsible, and under whose orders they work. (F. W. E.)

ADMIRALTY, HIGH COURT OF. This is a court of law, in which the authority of the lord high admiral is exercised in his *judicial* capacity. Very little has been left on record of the ancient prerogative of the admirals of England. For some time after the first institution of the office they judged all matters relating to merchants and mariners, which happened on the main sea, in a summary way, according to the laws of Oleron (so called because promulgated by Richard I. at that place). These laws, which were little more than a transcript of the Rhodian laws, became the universally-received customs of the western part of the world. "All the seafaring nations," says Sir Leoline Jenkins, "soon after their promulgation, received and entertained these laws from the English, by way of deference to the sovereignty of our kings in the British ocean, and to the judgment of our countrymen in sea affairs."

In the patents granted to the early admirals between the latter years of the reign of Henry III. and the close of that of Edward III., no mention is made of marine prerogatives or of civil power, nor does it appear that the admirals enjoyed either; but after the death of the latter, new and extraordinary powers were granted to them, and it would appear that they usurped others. The preamble to the 13 Richard II. stat. 1, c. 5, sets forth that "a great and common clamour and complaint hath been oftentimes made before this time, and yet is, for that the admirals and their deputies hold their sessions within divers places of this realm, as well within the franchise as without, accroaching to them greater authority than belongeth to their office, in prejudice of our lord the king and the common law of the realm, and in diminishing of divers franchises, and in destruction and impoverishing of the common people;" and the statute therefore directs that the admirals and their deputies shall not meddle from henceforth of any thing done within the realm, but only of a thing done upon the sea. Two years afterwards (15 Rich. II. c. 8), in consequence, as stated in the preamble of the statute, "of the great and grievous complaint of all the commons," it was ordained that the admiral's court should have no cognisance of any contracts, pleas, or quarrels, or of any thing done or arising within the bodies of counties, whether by land or by water, nor of wreck of the sea; but that the admiral should have cognisance of the death of a man, and of mayhem done in great ships being and hovering in the main stream of great rivers, yet only beneath the bridges of the same rivers nigh to the sea. He may also arrest ships in the great flotes for the great voyages of the king and of the realm, saving always to the king all manner of forfeitures and profits thereof coming, and have jurisdiction over the said flotes, but during the said voyages only. But if the admiral or his lieutenant exceed that jurisdiction, then, by 2 Henry IV. c. 11, the statute and the common law may be holden against them; and if a man pursues wrongfully in the admiralty court, his adversary may recover double damages at common law,



and the pursuant, if attained, shall incur the penalty of £10 to the king.

The place which, according to Spelman, is absolutely subject to the jurisdiction of the admiral is the sea; which, however, comprehends public rivers, fresh waters, creeks, and all places whatsoever, within the ebbing and flowing of the sea, at the highest water, the shores or banks adjoining, from all the first bridges to the seaward; and in these, he observes, the admiral hath full jurisdiction in all causes, criminal and civil, except treasons and the right of wreck. Lord Coke observes (5 Rep. 107), that between the high-water mark and the low-water mark the admiral hath jurisdiction *super aquam, ad plenitudinem maris*, and as long as it flows, though the land be *infra corpus comitatus* at the reflow, so as of one place there is *divinum imperium* interchangeably.

But though the statute restraineth the lord high admiral that he shall not hold plea of a thing rising in the body of a county, he is not restrained from making execution upon the land, but is empowered to take either body or goods upon the land; otherwise his jurisdiction would often prove a dead letter. He also can and does hold his court in the body of a county. So, likewise, the civil power may apprehend and try persons who may have been guilty of offences cognisable at common law, though committed in the fleet, in any port or harbour of Great Britain, or at sea, provided such persons have not already been tried for such offences either by court-martial or in the admiralty court; and in all ports, harbours, creeks, &c., lying in any county, the high admiral and the sheriff, or coroner, as the case may be, have concurrent jurisdiction.

By the 6 and 7 Will. IV. c. 63 the admiralty jurisdiction is extended to Prince of Wales' Island, Singapore, and Malacca; and under the 8 and 4 Vict. c. 65, the court has jurisdiction in the following cases:—

Whenever a vessel is arrested by process issuing from the said court, or the proceeds of any vessel are brought into the registry, to take cognisance of all claims in respect of any mortgage of such vessel.

To decide all questions as to the title to, or ownership of, such vessel, or the proceeds thereof remaining in the registry, arising in any cause of possession, salvage, damage, wages, or bottomry, instituted in the said court.

To decide all claims and demands whatsoever in the nature of salvage, or in the nature of towage, or for necessities supplied to any foreign vessel, and enforce the payment of the same, whether such vessel may have been in the body of the county or upon the high seas at the time when the service was rendered, or damage received, or necessities furnished, in respect of which claim is made.

To decide all matters and questions concerning booty of war on shore, or the distribution thereof, which it shall please her Majesty, by the advice of the privy council, to refer to the judgment of the said court, who shall proceed therein as in cases of prize of war.

And under § 40 of the 9 and 10 Vict. c. 99, to decide on all claims and demands whatsoever in the nature of salvage for services performed, whether on sea or land.

The high court of Admiralty has jurisdiction upon the high seas all over the world. It has an instance jurisdiction which is civil, and a prize jurisdiction in time of war. The latter jurisdiction does not extend to the admiralty courts of Ireland or Scotland, which never had prize commissions sent to them. It is of the highest importance in war time, when questions of seizure or detention of neutral ships arise, to have but one court of which to inquire concerning all causes, so as to expedite the action of the Foreign Office in dealing with representations from neutral powers. The causes which arise in time of peace are causes of collisions, of seamen's wages, bottomry, wearing unlawful colours, salvage, and causes of possession, where one part owner or minor claims to have security from those other owners who are going to send the ship on a foreign voyage that the ship shall return again. Causes under the Slave Act treaties are also cognisable here. The evidence is all documentary. In 1803 there were 1125 prize cases before the court; in 1804, 1144; in 1806, 2286; in 1807, 2789; and so on, above 1000 causes each year, down to the year 1811.

The criminal jurisdiction, which formerly comprehended all crimes whatever committed at sea, from larceny to homicide, which were triable at common law at the assizes if committed on shore, was much modified upon the report of the select committee on the high court of admiralty in 1833. Such offences are now triable at common law on surrender to the jurisdiction; but the judge of the admi-

ralty court may still sit with other commissioners of oyer and terminer. He has no longer any independent criminal jurisdiction.

The instance jurisdiction is permanent; the prize jurisdiction is by virtue of a special commission, *pro re nata*. Its issue is one of the first acts done on the outbreak of war. Appeals formerly lay from the civil decisions to the high court of delegates or specially-appointed commissioners; from the prize decisions to the prize commissioners. By the Acts 2 and 3 Will. IV. c. 92, and 3 and 4 Will. IV. c. 41, all appeals from admiralty court decisions of any kind lie to the sovereign, who is authorised to refer them to the judicial committee of the privy council.

The lord high admiral was assisted in his judicial functions by the following principal officers:—1. The vice-admiral; 2. The judge; 3. The registrar; 4. The advocate-general; 5. The counsel and judge-advocate; 6. The solicitor; 7. The procurator; 8. The marshal,—which officers are continued.

1. *The Vice-Admiral.* This officer is the admiral's deputy or lieutenant mentioned in the statutes of 13th and 15th Richard II., and was the person, most probably, who presided in the court. At present the office of vice-admiral of England is a perfect sinecure, generally conferred on some naval officer of high rank and distinguished character in the service. The salary of £434, 1s. 9d. per annum, attached to it in addition to half-pay, was abolished by order in council, 22d February 1870. The salary and office of rear-admiral of England were abolished by the same order in council. \* The salary was £342, 9s. per annum. Each county of England has its vice-admiral, which is little more than an honorary distinction, though the patent gives to the holder all the powers vested in the admiral himself. \* Similar powers were also granted to the judges of the admiralty county courts; but this was found so inconvenient and prejudicial to those who had suits to commence or defend before them, that the Duke of York, when lord high admiral, in 1663 caused instructions to be drawn up in order to assign to each his province, whereby the whole judicial power remained with the judge, and the upholding of the rights of the admiral, and levying and receiving the perquisites, &c., appertained to the vice-admiral.

Each of the four provinces of Ireland has its vice-admiral. There is one vice-admiral for all Scotland, and one for the Shetland and Orkney Islands. The governor of most of our colonies had a commission of vice-admiral granted to him by the lord high admiral or lords commissioners of the admiralty, and generally a commission from the king under the great seal, grounded on the 11 and 12 William III. c. 7, and further confirmed by 46 Geo. III. c. 54, by which he was authorised to try all treasons, piracies, felonies, robberies, murders, conspiracies, and other offences, of what nature or kind soever, committed on the seas, where the parties were taken into custody in places remote from England. The court consisted of seven persons at the least, of whom the governor, the lieutenant-governor, the vice-admiral, the flag-officer, or commander-in-chief of the squadron, the members of the council, the chief-justice, judge of the vice-admiralty court, captains of men-of-war, and secretary of the colony, were specially named in the commission; but any three of these, with four others selected from known merchants, factors, or planters, captains, lieutenants, or warrant officers of men-of-war, or captains, masters, or mates of merchant ships, constituted a legal court of piracy. By the 12 and 13 Vict. c. 96, all persons charged in any colony with offences committed on the sea may be dealt with in the same manner as if the offences had been committed on waters within the local jurisdiction of the courts of the colony.

The vice-admiralty courts in the colonies are of two descriptions. The one has power to inquire into the causes of detention of enemies or neutral vessels, to try and condemn the same for the benefit of the captors, as well as to take cognisance of all matters relating to the office of the lord high admiral. The other has only power to institute inquiries into misdemeanours committed in merchant vessels, and to determine petty suits, &c., and to guard the privileges of the admiral. The former are usually known by the name of *prize courts*, the latter by that of *instance courts*. Appeals from vice-admiralty courts abroad lay formerly to the high court of admiralty in England, and from that, if need were, to the high court of delegates, or in prize cases to the prize commissioners. By an Act of her present Majesty, all such appeals lie direct to the sovereign, who refers them to the judicial committee of the privy council.

The following are the colonies and foreign possessions in which vice-admiralty courts are now (1874) established. Others are constituted as occasion may require, in case of war:—

|                                                 |                                                             |
|-------------------------------------------------|-------------------------------------------------------------|
| Aden. ( <i>Slave trade jurisdiction only.</i> ) | Malta.                                                      |
| Antigua, Montserrat, and Barbuda.               | Manritius.                                                  |
| Australia, South.                               | Montserrat.                                                 |
| Australia, West.                                | Natal.                                                      |
| Bahamas.                                        | Norvis.                                                     |
| Barbadoes.                                      | New Brunswick.                                              |
| Bermuda.                                        | Newfoundland.                                               |
| Bombay.                                         | New South Wales.                                            |
| British Columbia.                               | New Zealand.                                                |
| British Guiana.                                 | Prince Edward's island.                                     |
| Calcutta.                                       | Quebec.                                                     |
| Canada.                                         | Queensland.                                                 |
| Cape of Good Hope.                              | St. Christopher.                                            |
| Ceylon.                                         | St. Helena.                                                 |
| Dominica.                                       | St. Lucia.                                                  |
| Falkland Islands.                               | St. Vincent.                                                |
| Gambia.                                         | Sierra Leone.                                               |
| Gibraltar.                                      | The Straits Settlements.                                    |
| Gold Coast.                                     | ( <i>Prince of Wales Island, Singapore, and Malacca.</i> )  |
| Grenada.                                        | Tasmania.                                                   |
| Halifax, Nova Scotia.                           | Tobago.                                                     |
| Honduras.                                       | Tortols and Virgin Islands.                                 |
| Hong Kong.                                      | Trinidad.                                                   |
| Jamaica.                                        | Vancouver's Island.                                         |
| Labuan.                                         | Victoria.                                                   |
| Madras.                                         | Zanzibar. ( <i>Limited slave trade jurisdiction only.</i> ) |

By the provisions of the Vice-admiralty Courts Act of 1863, The governor of a colony is *ex officio* vice-admiral, and the chief-justice *ex officio* judge of the vice-admiralty court.

In none of the patents to the lord high admiral, vice-admiral, or judge, is any mention made of prize jurisdiction. Lord Mansfield had occasion to search into the records of the court of admiralty in Doctors' Commons, to ascertain on what foundation this jurisdiction was exercised by the judge of the admiralty; but he could not discover any prize-act books farther back than 1643; no sentences farther back than 1648. The registrar could go no farther back than 1690. "The prior records," says his lordship, "are in confusion, illegible, and without index." The prize jurisdiction may therefore be considered as of modern authority, and distinct altogether from the ancient powers given to the admiral. To constitute the authority for trying prize causes, a commission under the great seal issues to the lord high admiral at the commencement of every war, to will and require the court of admiralty, and the lieutenant and judge of the said court, his surrogate or surrogates, to proceed upon all manner of captures, seizures, and reprisals, of all ships and goods that are or shall be taken; and to hear and determine according to the course of the admiralty, or the law of nations; and a warrant issues to the judge of the admiralty accordingly.

The admiralty court being in this respect a court in

which foreigners of all nations may become suitors, an appeal may be had from its decisions to a committee of the lords of the privy council, who hear and determine according to the established laws of nations.

At the breaking out of a war, the lord high admiral also receives a special commission from the crown, under the great seal, to empower him to grant letters of marque and reprisals against the enemy, he having no such power by his patent. These letters are either general or special: general, when granted to private men to fit out ships at their own charge to annoy the enemy; special, when in the case of any of our merchants being robbed of their estates or property by foreigners, the king grants them letters of reprisal against that nation, though we may be in amity with it. Before the latter can be sued for, the complainant must have gone through the prosecution of his suit in the courts of the state whose subjects have wronged him; where, if justice be denied, or vexatiously delayed, he must first make proof of his losses and charges in the admiralty court here; whereupon, if the Crown is satisfied he has pursued all lawful means to obtain redress, and his own interceding should produce no better effect, special letters of reprisal are granted; not, however, as must be evident, until a very strong case has been made out. This custom, which we may now consider as obsolete, seems to be a remnant of the law of ancient Greece, called *androlepsia*, by which, if a man was slain, the friends and relations of the deceased might seize on any three citizens of the place where the murderer took refuge, and make them slaves, unless he was delivered up. Both Oliver Cromwell and King Charles II. granted letters of reprisal. In 1638 the Duc d'Epemon seized on the ship "Amity" of London, for the service of the French king against the Spaniards, promising full satisfaction; but none being made, the owners obtained letters of reprisal from the Protector, and afterwards, in 1665, from Charles II. In 1666 Captain Butler Barnes had letters of reprisal against the Danes. The Dutch having burnt six English merchant vessels in the Elbe, within the territories of Hamburg, which city, instead of giving any assistance or protection, hindered the English from defending themselves, letters of reprisal were granted to the sufferers against that city. Lastly, one Justiniani, a noble Genoese, being indebted in a large sum to Joseph Como, a merchant in London, which he had several years solicited for without obtaining satisfaction, Captain Scott, commander of his Majesty's ship the "Dragon," stationed at that time in the Mediterranean, received orders to make reprisals upon the ships of that republic; upon which the debt was paid.

2. *The Judge.*—The patents to the judge of the admiralty and vice-admiralty courts run pretty nearly in the same manner as those of the lord high admiral, and point out the several matters of which he can take cognisance. The Parliament of 1640 established the office of judge of the admiralty court in three persons, with a salary of £500 a-year to each. At the Restoration there were two judges of the high court of admiralty, which sometimes proved inconvenient; for when they differed in opinion, no judgment could be had. These judges, before the Revolution, held their appointment only during pleasure. At that period, and under the provisions of the Bill of Rights, Sir Charles Hedges was constituted judge under the great seal of England, *quamdiu se bene gesserit*, with a salary of £400 a-year, and an additional £400 out of the proceeds of prizes and perquisites of the admiralty; but in the year 1725 the latter sum was diminished from the ordinary estimate by the House of Commons. The salary of Sir James Marriot, from 1778 to 1782, during the American war, was £800 a year, and £3700 added for fees. From 1794 to 1798, the salary was £1780, and £2500 for fees. During the sixteen years that Sir William Scott (Lord Stowell) was judge,



from 1793 to 1814, the salary was £2500, and the fees averaged £2800 a-year. Under the 3 and 4 Vict. c. 66, § 1, the salary is fixed at £4000 per annum. All fees of whatever kind, formerly payable to the judge, are now paid to the consolidated fund.

The court of admiralty is at present (1873), and pending the erection of the new law courts, held in Westminster. In the time of Henry IV. it was held in Southwark, either at a quay on the south side of the Thames, or in the ere-while church of St Margaret-on-Hill, most likely the former. Stow, in his *Survey* (A.D. 1598), says—"A part of this parish church of St Margaret is now a court, wherein the assizes and sessions be kept; and the court of admiralty is also there kept." Pepys also, in his *Diary* (17th March 1663), describes the court as sitting there. But it is probable that the sittings in St Margaret's Church were commenced shortly before Stow's time; for in the Rolls of Parliament, 11 Hen. IV. No. 61, the Commons complain that people are summoned by the officers of the admiral d' *Loundres à le Key de William Horton, Suthwerke*. Further, it would appear from an appeal made to the king, Henry IV., that the rule then was for the admiral's court to be held upon some wharf or quay within the flux and reflux of the tide. In the reign of Henry VIII., Horton's Quay, near London Bridge, is mentioned in the records of the high court of admiralty (3d Nov. 1541) as its usual place of sitting.

The judges of the vice-admiralty courts in certain of the colonies, limited by 41 George III. c. 96, are allowed a salary not exceeding to each the sum of £2000 a-year, to be paid out of the consolidated fund of Great Britain; together with profits and emoluments not exceeding to each the further sum of £2000 per annum, out of the fees to be taken by the said judges, of which a table is directed to be hung up in some conspicuous place in the court; and no judge is to take any fee beyond those specified, directly or indirectly, on pain of forfeiture of his office, and being proceeded against for extortion; and on his retirement from office after six years' service, or from some permanent infirmity, the Crown may, by authority of the Act above mentioned, grant unto such judge an annuity for the term of his life not exceeding £1000 per annum. This liberal provision puts the judges of the colonial courts of vice-admiralty above all suspicion of their decisions being influenced by unworthy motives—a suspicion they were not entirely free from when their emoluments depended mainly on their fees.

During the war of 1793–1815 a session of oyer and terminer to try admiralty causes was held at the Old Bailey, now the central criminal court, twice a-year. The commission for this purpose was of the same nature with those which are granted to the judges when they go on circuit; that is to say, to determine and punish all crimes, offences, and misdemeanours, and abuses; the end of both being the same, their *limits* different; the one relating to things done upon the land, the other to things done upon the water. The lords commissioners of the admiralty, all the members of the privy council, the chancellor and all the judges, the lords of the treasury, the secretary of the admiralty, the treasurer and commissioners of the navy, some of the aldermen of London, and several doctors of the civil law, were the members of this commission; any four of whom made a court.

The proceedings of the court, now probably obsolete, were continued *de die in diem*, or, as the style of the court was, from tide to tide.

3. *The Registrar of the Admiralty* formerly held his place by patent from the Crown. The patent was issued under the great seal of the court of admiralty, and the appointment was afterwards confirmed by patent under the great seal of the United Kingdom. The appointment was for life, and was often granted in reversion. The registrar

had no salary, the amount of his emoluments depending on the captures, droits, &c., condemned by the court which during the war of 1793–1815 were so enormous that in 1810 an Act was passed for regulating the offices of registrars of admiralty and prize courts, by which it is enacted "that no office of registrar of the high court of admiralty, or of the high court of appeals for prizes, or high court of delegates in Great Britain, shall, after the expiration of the interest now vested in possession or reversion therein, be granted for a longer term than during pleasure, nor be executed by deputy; that an account be kept in the said offices respectively of all the fees, dues, perquisites, emoluments, and profits received by and on account of the said registrars, out of which all the expenses of their offices are to be paid; that one-third of the surplus shall belong to the registrar and to his assistant (if an assistant should be necessary), and the remaining two-thirds to the consolidated fund of Great Britain, to be paid quarterly into the exchequer; the account of such surplus to be presented to the court at least fourteen days before each quarter-day, and verified on oath." Under the 3 and 4 Vict. c. 66, § 2, a yearly salary of £1400 is substituted for "all fees, dues, perquisites, emoluments, and profits," and which may be increased in time of war to £2000. The duties of the registrar are—1. To keep a public registry, to give attendance therein, and to preserve in a regular manner the registers, acts, records, and documents belonging to the office; 2. To attend all sittings of the court of admiralty, and to attend the judge at chambers; 3. To draw and sign all warrants, monitions, commissions, &c., issuing from the court; to attend other courts with minutes, &c., of the admiralty court when required; 4. To have the custody of all moneys paid into court or paid out of court.

4. *The Advocate-General*.—This officer is appointed by warrant of the lords commissioners of the admiralty. His duties are—to appear for the lord high admiral in his court of admiralty, court of delegates, and other courts; to move and debate in all causes wherein the rights of the admiral are concerned; for which he had antiently a salary of 20 marks (£13, 6s. 8d.) a-year. In May 1803, Dr William Battine, who was appointed in 1791, had an addition of £200 to his salary, "for his extraordinary trouble and attendance during the present hostilities." His salary was continued to him and his successor, Dr Arnold, till 1816; since that time the allowance has been reduced to its original amount of £13, 6s. 8d. Formerly the admiral's advocate was always retained as leading counsel, but after the droits were transferred to the crown, he was gradually supplanted by the king's advocate, who was generally retained in all cases, the admiralty advocate acting only as junior counsel; and while the former during the war made sometimes from £15,000 to £20,000 a-year, the latter rarely received from his professional duties more than from £1500 to £2000 a-year.

5. *The Counsel and Judge-Advocate for the affairs of the Admiralty and Navy* is the law officer who is chiefly consulted on matters connected with the military duties of the lord high admiral. He advises also on all legal questions. His salary is £100 a-year, besides his fees, which in time of war may be reckoned to amount to from £1200 to £1800 a-year. Till the present reign the offices of counsel of the admiralty and judge-advocate of the fleet were separate and distinct, the latter being a sinecure appointment, with a salary of £182, 10s. attached to it. The salary is now abolished. The duties are very light, the veritable work of the office being discharged by deputy judge-advocate appointed on each occasion of a court-martial, and by resident law agents at Portsmouth and Plymouth, who receive salaries in lieu of all fees and charges.

6. *The Solicitor to the Admiralty* is also an officer ap-

pointed during pleasure by the lords of the admiralty. He is the general legal adviser, in the first instance, of the lords commissioners; and since 1869 there have been added to his other functions those of registrar of public securities and custodian of all public securities and bonds belonging to the admiralty. His salary is £1600 a-year in lieu of all fees, bills, and disbursements, with an allowance of £1300 a-year for assistance of clerks. His office is provided for him.

7. *The Procurator*.—The admiralty's proctor stands precisely in the same situation to the queen's proctor that his advocate does to that of the queen, though there is not quite so great a difference in their emoluments. They act as the attorneys or solicitors in all causes concerning the queen's and the lord high admiral's affairs in the high court of admiralty and other courts. All prize causes are conducted by the queen's proctor. It is supposed that in some years of war, in the early part of the century, the proctor did not receive less than £20,000 a-year.

8. *The Marshal*.—This officer receives his appointment from the lord high admiral or lords commissioners of the admiralty. His appointment is under the seal of the high court of admiralty during pleasure, and is confirmed by letters patent from the Crown. His duties are to arrest ships and persons; to execute all processes or orders issuing from the court; to attend, in person or by deputy, the judge with the silver oar (the ancient emblem of maritime jurisdiction); and formerly also to attend executions. It is also the duty of the marshal or his deputy to arrest, under warrant from the admiralty, any officer not beneath the rank of post captain who may be ordered for trial by court-martial; and to see to the delivery of sentenced prisoners to their place of punishment. His emoluments formerly depended on the number of prizes brought into port for condemnation, and the number of ships embargoed, and might probably be reckoned in time of war, *communibus annis*, from £1500 to £2000 a-year, out of which he had to pay about £400 a-year to a deputy. He had no salary. The office can, however, be no longer performed by deputy, except in case of illness, § 9 of the 3 and 4 Vict. c. 66. The marshal is now paid by a salary of £500, in addition to his travelling expenses.

(See *Orders in Council* since February 1870; Campbell's *Lives of the British Admirals*; O'Byrne's *Naval Biographical Dictionary*; Rymer's *Fœdera*; Pepys' *Naval Collections*, and Pepys' *Diary*; *The Black Book of the Admiralty* (republished by the Master of the Rolls); Stephen's *Commentaries on the Laws of England*; Stow's *Survey of London*; *Rolls of Parliament*; Report of Committee appointed by the Treasury in 1836 to inquire into the fees and emoluments of public offices; Sir Harris Nicolas's *History of British Navy*.) (F. W. R.)

ADMIRALTY, IRELAND.—For all executive functions Ireland is subject to the jurisdiction and orders of the lord high admiral, or lords commissioners for executing the office, of Great Britain. For judicial purposes, however, an admiralty court sits in the Four Courts, Dublin, having a judge, a registrar, a marshal, and other officers. In peace time and war time alike it exercises only an instance jurisdiction. No prize commission has ever issued to it.

ADMIRALTY, SCOTLAND. At the Union, while the national functions of the lord high admiral were merged in the English office, there remained a separate court of admiralty, with subsidiary local courts, having civil and criminal jurisdictions in maritime questions. The separate courts were abolished in 1831, and their powers merged in the courts of session and judiciary, and the local courts.

ADMIRALTY CHARTS. These useful aids to navigation are constructed in the hydrographic department of the British Admiralty, by specially-appointed surveyors and

draughtsmen, and they are issued to the public by order of the lords commissioners of the admiralty. They are divided into various sections as follows:—1. English and Irish Channels and coasts of the United Kingdom; 2. North Sea and adjacent coasts; 3. Baltic Sea; 4. North and west coasts of France, Spain, and Portugal; 5. Mediterranean, Black Sea, and Sea of Azov; 6. Atlantic Ocean and Islands; 7. Arctic Sea and north and east coasts of America; 8. West Indies, Gulf of Mexico, &c.; 9. South America, east coast; 10. West coasts of South and North America; 11. Africa, Madagascar, Mauritius, Red Sea, &c.; 12. East Indies, Arabian coast, &c.; 13. Indian Archipelago, China Sea, Japan, &c.; 14. Australia, New Zealand, &c.; 15. Pacific Ocean islands. They are about 3000 in number, of various sizes and scales, and the prices vary from 6d. to 10s. Accompanying the charts there are books of sailing directions, tables, and lists of lights. Similar charts as those of the British Admiralty are issued by the United States Coast Survey, as well as by the Russian and French governments. The superintendent of the United States Coast Survey issues an annual report, showing the progress of the survey, and containing much valuable information.

ADMIRALTY ISLAND, an island belonging to the United States, about 90 miles long from N. to S., and 25 miles broad, lying between King George III. Archipelago and the mainland, in 58° N. lat., 134° W. long. Its coasts, which are generally steep and rocky, are indented with several accessible and commodious bays. The island has abundance of good water, and is covered with vines, which grow there to a very large size.

ADMIRALTY ISLANDS, a group of about forty islands lying to the N.E. of New Guinea, between 2° and 3° S. lat., and 146° 18' and 147° 46' E. long. The largest is about 50 miles in length; the others are very small, and all rise but little above the sea-level. Their exuberant vegetation, and in particular the groves of cocoa-nut trees, give them a very beautiful appearance. The islands were discovered by the Dutch in 1616, but have seldom been visited, access being difficult on account of the surrounding reefs. The natives are tall, and of a tawny colour.

ADOLPHUS, JOHN; historian and barrister, was born in London on the 7th August 1768. He was educated under the care of a grand-uncle, and after making a voyage to the West Indies was enrolled as an attorney about the year 1790. Called to the bar in 1807, he devoted himself to practice in criminal causes, and in a few years attained a leading position among Old Bailey counsel. His masterly defence of Thistlewood and the Cato Street conspirators, for which he had been retained only a few hours before the trial, did much to extend his reputation. He was very skilful in the management of his cases, but his hastiness of temper frequently led to unseemly altercations with other counsel. He held a good position in society, and was on terms of intimacy with the leading literary men of the day. *The History of England from the Accession of George III. to 1783*, which he published in 1802, was favourably noticed in the *Edinburgh Review* for its impartiality and accuracy. A new and enlarged edition of this work, in eight volumes, was in preparation, but only seven volumes were completed when the author died, 16th July 1845. His other literary works were—*Biographical Memoirs of the French Revolution* (1799); *The British Cabinet* (1799); *History of France from 1790 to 1802* (1803); *Memoirs of John Bannister*.

ADOLPHUS, JOHN LEYCESTER, son of the above, also a distinguished barrister (died 1862), was the first to pierce the mask of the author of *Waverley*, in a series of critical letters addressed to Richard Heber, which he published in 1821.



ADONIS, according to some authors, the son of Theias, king of Assyria, and his daughter Smyrna [Myrrha], was the favourite of Venus. He was fond of hunting; and Venus often warned him not to attack the larger wild beasts; but neglecting the advice, he was killed by a wild boar he had rashly wounded. Venus was inconsolable, and turned him into a flower of a blood colour, supposed by some to be an anemone. Adonis had to spend half the year in the lower regions, but during the other half he was permitted to revisit the upper world, and pass the time with Venus. No grief was ever more celebrated than that of Venus for Adonis, most nations round the Mediterranean having perpetuated the memory of it by anniversary ceremonies. "The tale of Adonis (Keightley's *Mythology*) is evidently an eastern myth. His own name and those of his parents refer to that part of the world. He appears to be the same with the Thammuz mentioned by the prophet Ezekiel (viii. 14), and to be a Phœnician personification of the sun, who during part of the year is absent, or, as the legend expresses it, with the goddess of the under world; during the remainder with Astarte, the regent of heaven." Among the Egyptians, Adonis is supposed to have been adored under the name of Osiris, the husband of Isis; but he was sometimes called by the name of Anmuzz or Thammuz, *the concealed*, to denote probably his death or burial. It has been thought it is he the Hebrews call the *dead* (Ps. cvi. 28, and Lev. xix. 28), because his worshippers wept for him, and represented him as one dead; and at other times they call him the *image of jealousy* (Ezek. viii. 3, 5), because he was an object of jealousy to other gods. The Syrians, Phœnicians, and Cyprians worshipped Adonis; and Calmet was of opinion that this worship may be identified with that of the Moabitish Baal-peor. Modern critics plausibly connect the divine honours paid to Adonis with the mysterious rites of phallic worship, which, in some shape or other, prevailed so extensively in the ancient world.

ADONIS, in *Ancient Geography*, a small river rising in Mount Lebanon, and falling into the sea at Byblus. When in flood its waters exhibit a deep red tinge; hence the legend that connects it with the wound of Adonis.

"While smooth Adonis from his native rock,  
Ran purple to the sea, supposed with blood  
Of Thammuz yearly wounded."—MILTON.

ADONIS, a genus of ranunculaceous plants, known commonly by the names of Pheasant's Eye and *Flos Adonis*. There are ten or twelve species given by authors, but they may be probably reduced to three or four. There are two indigenous species, *Adonis autumnalis* and *Adonis vernalis*. They are commonly cultivated. An early flowering species, *Adonis vernalis*, is well worthy of cultivation.

ADOPTIAN CONTROVERSY, a controversy relating to the sonship of Christ, raised in Spain by Elipandus, archbishop of Toledo, and Felix, bishop of Urgel, towards the close of the 8th century. By a modification of the doctrine of Nestorius they maintained that Christ was really the Son of God in his divine nature alone, and that in his human nature he was only the Son of God by adoption. It was hoped that this view would prove more acceptable to the Mahometans than the orthodox doctrine, and Elipandus especially was very diligent in propagating it. Felix was instrumental in introducing it into that part of Spain which belonged to the Franks, and Charlemagne thought it necessary to assemble a synod at Raision (792), before which the bishop was summoned to explain and justify the new doctrine. Instead of this he renounced it, and confirmed his renunciation by a solemn oath to Pope Adrian, to whom the synod sent him. The recantation was probably insincere, for on returning to his diocese he taught adoptianism as before. Another synod

was held at Frankfort in 794, by which the new doctrine was again formally condemned, though neither Felix nor any of his followers appeared. A friendly letter from Alcuin, and a controversial pamphlet, to which Felix replied, were followed by the sending of several commissions of clergy to Spain to endeavour to put down the heresy. Archbishop Leidrad of Lyons being on one of these commissions, persuaded Felix to appear before a synod at Aix-la-Chapelle in 799. There, after six days' disputing with Alcuin, he again recanted his heresy. The rest of his life was spent under the supervision of the archbishop at Lyons, where he died in 816. Elipandus, secure in his see at Toledo, never swerved from the adoptian views, which, however, were almost universally abandoned after the two leaders died. The controversy was revived by solitary advocates of the heretical opinions more than once during the Middle Ages, and the questions on which it turns have, in one form or another, been the subject of frequent discussion.

ADOPTION, the act by which the relations of paternity and filiation are recognised as legally existing between persons not so related by nature. Cases of adoption were very frequent among the Greeks and Romans, and the custom was accordingly very strictly regulated in their laws. In Athens the power of adoption was allowed to all citizens who were of sound mind, and who possessed no male offspring of their own, and it could be exercised either during lifetime or by testament. The person adopted, who required to be himself a citizen, was enrolled in the family and *demus* of the adoptive father, whose name, however, he did not necessarily assume. In the interest of the next of kin, whose rights were affected by a case of adoption, it was provided that the registration should be attended with certain formalities, and that it should take place at a fixed time—the festival of the *Thargelia*. The rights and duties of adopted children were almost identical with those of natural offspring, and could not be renounced except in the case of one who had begotten children to take his place in the family of his adoptive father. Adopted into another family, children ceased to have any claim of kindred or inheritance through their natural father, though any rights they might have through their mother were not similarly affected. Among the Romans the existence of the *patria potestas* gave a peculiar significance to the custom of adoption. The motive to the act was not so generally childlessness, or the gratification of affection, as the desire to acquire those civil and agnate rights which were founded on the *patria potestas*. It was necessary, however, that the adopter should have no children of his own, and that he should be of such an age as to preclude reasonable expectation of any being born to him. Another limitation as to age was imposed by the maxim *adoptio imitatur naturam*, which required the adoptive father to be at least eighteen years older than the adopted children. According to the same maxim ennuuchs were not permitted to adopt, as being impotent to beget children for themselves. Adoption was of two kinds according to the state of the person adopted, who might be either still under the *patria potestas* (*alieni juris*), or his own master (*sui juris*). In the former case the act was one of *adoption proper*, in the latter case it was styled *adrogation*, though the term adoption was also used in a general sense to describe both species. In adoption proper the natural father publicly sold his child to the adoptive father, and the sale being thrice repeated, the maxim of the Twelve Tables took effect, *Si pater filium ter venunduit, filius a patre liber esto*. The process was ratified and completed by a fictitious action of recovery brought by the adoptive father against the natural parent, which the latter did not defend, and which was therefore known as the *cessio in jure*. *Adrogation* could be accomplished originally only by the authority of the people assembled in the

*Comitia*, but from the time of Diocletian it was effected by an imperial rescript. Females could not be adrogated, and, as they did not possess the *patria potestas*, they could not exercise the right of adoption in either kind. The whole Roman law on the subject of adoption will be found in Justinian's *Institutes*, lib. i. tit. 11. In Hindoo law, as in nearly every ancient system, wills are almost unknown, and adoptions take their place. The strict law of adoption in India has been relaxed to the extent that a Hindoo widow may adopt when her deceased husband has not done so. Adoption is not recognised in the laws of England and Scotland, though there are legal means by which one may be enabled to assume the name and arms and to inherit the property of a stranger. In France and Germany, which may be said to have embodied the Roman law in their jurisprudence, adoption is regulated according to the principles of Justinian, though with several more or less important modifications, rendered necessary by the usages of these countries respectively. The part played by the legal fiction of adoption in the constitution of primitive society and the civilisation of the race is so important, that Sir Henry S. Maine, in his valuable work on *Ancient Law*, expresses the opinion that, had it never existed, the primitive groups of mankind could not have coalesced except on terms of absolute superiority on the one side, and absolute subjection on the other. With the institution of adoption, however, one people might *feign itself* as descended from the same stock as the people to whose *sacra gentilitia* it was admitted; and amicable relations were thus established between stocks which, but for this expedient, must have submitted to the arbitrament of the sword with all its consequences.

ADOPTION, as a Biblical term, occurs only in the *New Testament*. In Old Testament history the practice was unknown, though cases approximating to it have been pointed out. In the New Testament *vioberia* occurs in several passages, on which is founded one of the leading doctrines of theology.

ADORATION (from *os*, *oris*, the mouth, or from *oro*, to pray), an act of homage or worship which, among the Romans, was performed by raising the hand to the mouth, kissing it, and then waving it in the direction of the adored object. The devotee had his head covered, and after the act turned himself round from left to right. Sometimes he kissed the feet or knees of the images of the gods themselves, and Saturn and Hercules were adored with the head bare. By a natural transition the homage that was at first paid to divine beings alone came to be paid to men in token of extraordinary respect. Those who approached the Greek and Roman emperors adored by bowing or kneeling, laying hold of the imperial robe, and presently withdrawing the hand and pressing it to the lips. In eastern countries adoration was performed in an attitude still more lowly. The Persian method, introduced by Cyrus, was to bend the knee and fall on the face at the prince's feet, striking the earth with the forehead, and kissing the ground. Homage in this form was refused by Conon to Artaxerxes, and by Callisthenes to Alexander the Great. In England the ceremony of kissing the king's or queen's hand, and some other acts which are performed kneeling, may be described as forms of adoration. Adoration is applied in the court of Rome to the ceremony of kissing the Pope's foot, a custom which is said to have been introduced by the popes after the example of the Emperor Diocletian. In the Romish Church a distinction is made between *Latria*, a worship due to God alone, and *Dulia* or *Hyperdulia*, the adoration paid to the Virgin, saints, martyrs, crucifixes, the host, &c.

ADOUR, the ancient *Aturus*, a river of France which rises near Barège, in the department of Upper Pyrenees,

and, flowing first northwards, then with a circuit to the west, passes through the departments of Gers and Landes, and falls into the Bay of Biscay 3 miles below Bayonne. Its length is about 180 miles, and it is navigable for about 70 miles, as far as St Séver. Bagnères-de-Bigorre, Tarbes, and Dax are the other important towns on its banks.

ADOWA, the capital of Tigré, in Abyssinia, is situated in 14° 12' N. lat., 39° 3' E. long., on the left bank of the River Hasam, 145 miles N.E. of Gondar. It is built on the eastern declivity of a hill overlooking a small plain, and has regular streets, ornamented with trees and gardens. The town derives its chief importance from its situation on the route between Massowah and Gondar, which has caused it to become the great entrepôt of traffic between the extensive table-land of Tigré and the coast. Gold and ivory are included in its transit trade, and hardware is manufactured, as well as the coarse cotton cloth which circulates in Abyssinia as the medium of exchange in place of money. Population about 6000.

ADRA, the ancient *Abdera*, a seaport of Spain on the Mediterranean, in the province of Almería, 60 miles S.E. of Grenada. Lead is extensively wrought in the neighbourhood, and exported to Marseilles. The other exports include wheat and sugar. Population, 7400.

ADRASTUS, in *Legendary History*, was the son of Talaus, king of Argos, and Lysianassa, daughter of Polybus, king of Sicyon. Being driven from Argos by Amphiaraus, Adrastus repaired to Sicyon, where he became king on the death of Polybus. After a time he was reconciled to Amphiaraus, to whom he gave his sister in marriage, returned to Argos, and occupied the throne. He acquired great honour in the famous war against Thebes, which he undertook for the restoration of his son-in-law Polynices, who had been deprived of his rights by his brother Eteocles, notwithstanding the agreement between them. Adrastus, followed by Polynices and Lydeus, his two sons-in-law, Amphiaraus, his brother-in-law, Capaneus, Hippomedon, and Parthenopæus, marched against the city of Thebes, and on his way is said to have founded the Nemean games. This is the expedition of the *Seven Worthies against Thebes* which the poets have made nearly as famous as the siege of Troy. As Amphiaraus had foretold, they all lost their lives in this war except Adrastus, who was saved by the speed of his horse Arion. Ten years after, at the instigation of Adrastus, the war was renewed by the sons of the chiefs that had fallen. This expedition was called the *War of the Epigoni*, and ended in the taking and destruction of Thebes. None of the followers of Adrastus perished in it except his son Ægialeus. The death of this son affected Adrastus so much that he died of grief at Megara, as he was leading back his victorious army.

ADRIA, a city of Italy, in the province of Rovigo, between the rivers Po and Adige. It is a place of great antiquity, and was at an early period a seaport of such importance and celebrity as to give name to the sea on which it stood. Originally an Etruscan colony, it enjoyed for a time remarkable prosperity; but under the Romans it appears never to have been of much importance, and after the fall of the Western Empire it rapidly declined. The dykes which protected the surrounding country from inundation were neglected, the canals became choked, and the mud and other deposits brought down by the waters of the Po and Adige caused a gradual extension of the land into the Adriatic, so that Adria ceased to be a seaport, and is now 16 miles from the sea, on whose shores it formerly stood. By the draining of the neighbouring lands, the modern town has been much improved. It has some trade in grain, cattle, fish, wine, and earthenware, is the seat of a bishopric, and has a museum of Greek and Roman antiquities. A little to the south, extensive remains of the



ancient city have been discovered deeply imbedded in the accumulated soil. The population of Adria is 10,000.

**ADRIA** (δ' Ἀδρίας—Acts xxvii. 27) in St Paul's time meant all that part of the Mediterranean between Crete and Sicily. This fact is of importance, as it relieves us from the necessity of finding the island of Melita, on which Paul was shipwrecked, in the present Adriatic Gulf.

**ADRIAN**, a town of the United States, capital of Lenawee co., Michigan, situated on a branch of the Raisin river, and on the Michigan Southern Railway, 73 miles W.S.W. of Detroit. Adrian is the centre of trade for the surrounding district, which is chiefly grain-producing. Its extensive water-power is employed in mills of various kinds. It has several fine churches and other public buildings. Population in 1870, 8438.

**ADRIAN**, **PUBLIUS ÆLIUS**, Roman emperor. See **HADRIAN** and **ROMAN HISTORY**.

**ADRIAN** (sometimes written **HADRIAN**) was the name of six popes:—

**ADRIAN I.**, son of Theodore, a Roman nobleman, occupied the pontifical chair from 772 to 795. Soon after his accession the territory that had been bestowed on the popes by Pepin was invaded by Desiderius, king of the Lombards, and Adrian found it necessary to invoke the aid of Charlemagne, who entered Italy with a large army, and repelled the enemy. The pope acknowledged the obligation by conferring upon the emperor the title of Patrician of Rome, and Charlemagne made a fresh grant of the territories originally bestowed by his father, with the addition of Ancona and Benevento. The friendly relations thus established between pope and emperor continued unbroken, though a serious difference arose between them on the question of the worship of images, to which Charlemagne and the Gallican Church were strongly opposed, while Adrian favoured the views of the Eastern Church, and approved the decree of the Council of Nicæa (787), confirming the practice and excommunicating the iconoclasts. It was in connection with this controversy that Charlemagne wrote the so-called *Libri Carolini*, to which Adrian replied by letter, anathematising all who refused to worship the images of Christ, or the Virgin, or saints. Notwithstanding this, a synod, held at Frankfurt in 794, anew condemned the practice, and the dispute remained unsettled at Adrian's death. An epitaph written by Charlemagne in verse, in which he styles Adrian "father," proves that his friendship with the pontiff was not disturbed by the controversy in which they were so long engaged.

**ADRIAN II.**, born at Rome, became pope in 867, at the age of seventy-six. He faithfully adhered to the ambitious policy of his immediate predecessor, Nicholas I., and used every means to extend his authority. His persistent endeavours to induce Charles the Bald to resign the kingdom of Lorraine to the emperor were unsuccessful. Hincmar, archbishop of Rheims, who had crowned Charles, denied the pope's right to interfere in the matter, and maintained that the threatened excommunication of the king's adherents would have no validity. Adrian was for the time more successful in his contest with the patriarch of Constantinople—the sentence of deposition he passed upon Photius being confirmed by a council of the Eastern Church held in 869-70. His arrogant measures were, however, the immediate occasion of the schism between the Greek and Latin churches. Adrian had himself been married, but put away his wife on ascending the papal throne, and a council called by him at Worms in 868 decreed the celibacy of the clergy. He died in 872.

**ADRIAN III.**, born at Rome, succeeded Martin II. in 884, and died in 885 on a journey to Worms.

**ADRIAN IV.** whose name was Nicholas Breakspere,

was born before 1100 A.D. at Langley, near St Albans, in Hertfordshire, and is the only Englishman who has occupied the papal chair. His request to be allowed to take the habit of the monastery of St Albans having been refused by Abbot Richard, he proceeded to Paris, where he studied with diligence, and soon attained great proficiency, especially in theology. Being admitted, after a period of probation, a regular clerk in the monastery of St Rufus, in Provence, he distinguished himself so much by his learning and strict observance of the monastic discipline that he was chosen abbot when the office fell vacant. His merit became known to Pope Eugenius III., who created him cardinal-bishop of Alba in 1146, and sent him two years later as his legate to Denmark and Norway. On this mission he converted many of the inhabitants to Christianity, and erected Upsal into an archiepiscopal see. Soon after his return to Rome, Anastasius, successor of Eugenius, died, and Nicholas was unanimously chosen pope, against his own inclination, in Nov. 1154. On hearing of the election, Henry II. of England sent the abbot of St Albans and three bishops to Rome with his congratulations, which Adrian acknowledged by granting considerable privileges to the monastery of St Albans, including exemption from all episcopal jurisdiction except that of Rome. The bestowal by Adrian of the sovereignty of Ireland upon the English monarch was a practical assertion of the papal claim to dispose of kingdoms. The act, besides facilitating and hastening the subjection of Ireland to England, was also the means of inducing Henry to yield the long-contested point of lay investiture to ecclesiastical offices. The beginning of Adrian's pontificate was signalised by the energetic attempts of the Roman people to recover their ancient liberty under the consuls, but the pope took strong measures to maintain his authority, compelling the magistrates to abdicate, laying the city under an interdict, and procuring the execution of Arnold of Brescia (1155). In the same year he excommunicated William, king of Sicily, who had ravaged the territories of the church, but the ban was removed and the title of King of the Two Sicilies conferred on William in the following year, on the promise of a yearly tribute to the Holy See. With Adrian commenced the long and bitter conflict between the papal power and the house of Hohenstaufen which ended in the humiliation of the latter. Frederick Barbarossa having entered Italy at the head of a large army for the purpose of obtaining the crown of Germany from the hands of the pope, Adrian met him at Sutri. The demand that he should hold the pope's stirrup as a mark of respect was at first refused by Frederick, whereupon the pope on his part withheld from the emperor the *oculum pacis*, and the cardinals ran away in terror. After two days' negotiation, Frederick was induced to yield the desired homage, on the representation that the same thing had been done by his predecessors. His holiness then conducted the emperor to Rome, where the ceremony of coronation took place in the Church of St Peter's. It was in these transactions that the quarrel originated. A letter addressed by the pope to Frederick and the German bishops in 1157 asserted, on the ground of the ceremonies that had taken place, that the emperor held his dominions as a *beneficium*. The expression, being interpreted as denoting feudal tenure, stirred up the fiercest indignation of Frederick and the Germans, and though explanations were afterwards given with the view of showing that the word had not been used in an offensive sense, the breach could not be healed. Adrian was about to pronounce the sentence of excommunication upon Frederick when he died at Anagni on the 1st Sept. 1159.

**ADRIAN V.**, a Genoese, whose name was Ottoboni Fieschi, occupied the papal throne for only five weeks in 1276. When congratulated on his accession he replied in the

well-known words, "I wish you had found me a healthy cardinal rather than a dying pope."

ADRIAN VI., born of humble parentage at Utrecht in 1459, studied at the university of Louvain, of which he became vice-chancellor. He was chosen by the Emperor Maximilian to be tutor to his grandson, the Archduke Charles, through whose interest as Charles V. he was afterwards raised to the papal throne. In 1517 he received the cardinal's hat from Leo X., and in 1519 he was made bishop of Tortosa. After the death of Ferdinand he was for a time regent of Spain. He was chosen pope Jan. 9, 1522; but the election was very displeasing to the people of Rome, as the new pope, in contrast with his predecessor Leo, was known to be very rigid in discipline and frugal in his mode of living. On his accession, contrary to the usual custom, he did not change his name, and he showed his dislike to ostentation in many other ways. In regard to the great fact with which he had to deal—the Reformation—Adrian's conduct showed that he did not fully estimate the gravity of the crisis. Acknowledging the corruptions of the church, he did his utmost to reform certain external abuses; but when his proposed measures failed to win back Luther and the other reformers, he immediately sought to suppress their doctrines by force. He died on the 14th September 1523. So little did the people care to conceal their joy at the event that they wrote on the door of his physician's house the words "the saviour of his country."

ADRIAN, CARDINAL, was born at Corneto, in Tuscany, and studied at Rome. He was sent by Innocent VIII. as nuncio to Britain, to endeavour to reconcile James III. of Scotland and his subjects. That king having died, Adrian remained in England, where Henry VII. presented him to the bishopric of Hereford, and afterwards to that of Bath and Wells; but he never resided in either of these dioceses. On his return to Rome he became secretary to Pope Alexander VI., who employed him in various missions, and subsequently invested him with the purple. It was Adrian in particular that Alexander is said to have meant to poison in order that he might seize on his great wealth, when, as is generally reported, he fell a victim to his own wickedness. Not long after the elevation of Leo X. to the papal chair he was implicated in the conspiracy of Cardinal Petrucci against that pontiff. He confessed his guilt; and pardon being offered only on condition of his payment of a fine of 25,000 ducats, he resolved to fly from Rome. It is supposed that he was murdered by a domestic who coveted his wealth. Adrian was one of the first who sought to restore the Latin tongue from its mediæval corruptions to classical purity. He wrote *De Vera Philosophia*, a religious treatise, printed at Cologne in 1548; *De Sermone Latino*, a learned work, published at Rome in 1515, and repeatedly since; a treatise, *De Venatione*; and some Latin verses.

ADRIANI, GIOVANNI BATTISTA, born of a patrician family of Florence about 1511, was secretary to the republic of Florence, and for thirty years professor of rhetoric at the university. He wrote a history of his own times, from 1536 to 1574, in Italian, which is generally, but according to Brunet erroneously, considered a continuation of Guicciardini. De Thou acknowledges himself greatly indebted to this history, praising it especially for its accuracy. Adriani composed funeral orations on the Emperor Charles V. and other noble personages, and was the author of a long letter on ancient painters and sculptors prefixed to the third volume of Vasari. He died at Florence in 1579.

ADRIANOPOLE (called by the Turks EYRENER), a city of European Turkey, in the province of Rumelia, 137 miles W.N.W. of Constantinople; 41° 41' N. lat., 26° 35' E. long. It is pleasantly situated partly on a hill and partly on the banks of the Tundja, near its confluence

with the Maritza. Next to Constantinople, Adrianople is the most important city of the empire. It is the seat of a bishop of the Greek Church. The streets are narrow, crooked, and filthy; its ancient citadel, and the walls which formerly surrounded the town, are now in ruins. Of its public buildings the most distinguished are the *Eski-Serai*, the ancient palace of the sultans, now in a state of decay; the famous bazaar of Ali Pacha; and the mosque of the Sultan Selim II., a magnificent specimen of Turkish architecture, which ranks among the finest Mahometan temples. The city has numerous baths, caravanseries, and bazaars; and considerable manufactures of silk, leather, tapestry, woollens, linen, and cotton, and an active general trade. Besides fruits and agricultural produce, its exports include raw silk, cotton, opium, rose-water, attar of roses, wax, and the famous dye known as Turkey red. The surrounding country is extremely fertile, and its wines are the best produced in Turkey. The city is supplied with fresh water by means of a noble aqueduct carried by arches over an extensive valley. There is also a fine stone bridge here over the Tundja. During winter and spring the Maritza is navigable up to the town, but Enos, at the mouth of that river, is properly its seaport. Adrianople was called Uskadama previous to the time of the Emperor Hadrian, who improved and embellished the town, and changed its name to Hadrianopolis. In 1360 it was taken by the Turks, who, from 1366 till 1453, when they got possession of Constantinople, made it the seat of their government. In the campaign of 1829 Adrianople surrendered to the Russians without making any resistance, but was restored after the treaty of peace signed the same year. Population, 140,000.

ADRIATIC SEA, the *Adriaticum Mare* of the ancients, is an arm of the Mediterranean which separates Italy from Triest, Croatia, Dalmatia, and Albania. It extends from 40° to 45° 50' N. lat. in a N.W. direction. Its extreme north-west portion forms the Gulf of Venice, and on the east side are the gulfs of Triest, Fiume, Cattaro, and Drino. Its greatest length is 450 miles, its mean breadth 90 miles, and its depth varies from 12 to 22 fathoms. The western or Italian coasts are generally low and marshy; but the eastern shores are steep and rocky, and the abounding creeks and inlets, with the numerous islands, afford to mariners many safe natural harbours. The ebbs and flows of the tide in the Adriatic are inconsiderable, though more observable than in the Mediterranean generally; and its saltness is a little greater than that of the ocean. The prevalence of sudden squalls from the N.E. and S.E. renders its navigation hazardous, especially in winter. Except the Po and Adige, no considerable rivers flow into the Adriatic. Its chief emporia of trade are Venice, Triest, and Ancona. The port of Brindisi, on the Italian coast, near the southern extremity of the Adriatic, is rapidly rising in importance as the point of arrival and departure of the Peninsular and Oriental Company's steamers conveying the overland mails between England and the East. The name Adriatic is derived from Adria, between the mouths of the Po and the Adige, and not from Adria in Picenum. (See *Highlands and Islands of the Adriatic*, by A. A. Paton, 2 vols. 8vo, 1849; *Shores of the Adriatic*, by Viscountess Strangford, 1864.)

ADULE or ADULIS, a town on the Red Sea. See ZULLA.

ADULLAM, in *Scripture Geography*, a city in the plain country of the tribe of Judah. The cave Adullam, in which David took refuge after escaping from Gath (1 Sam. xxii. 1), was probably situated among the mountains to the east of Judah, near the Dead Sea. From its being described as the resort of "every-one that was in distress," or "in debt," or "discontented," it has often been humorously alluded to, as by the Baron of Bradwardine in *Waverley*, chap. 57.



## ADULTERATION

**A**DULTERATION, the act of debasing a pure or genuine commodity for pecuniary profit, by adding to it an inferior or spurious article, or by taking from it one or more of its constituents. The term is derived from the Latin *adultero*, which in its various inflections signifies to defile, to debase, to corrupt, to sophisticate, to falsify, to counterfeit, &c. The objects of adulteration are fourfold, namely, to increase the bulk or weight of the article, to improve its appearance, to give it a false strength, or to rob it of its most valuable constituents. All these adulterations are manifestly of a designedly fraudulent character, and are therefore properly the subjects of judicial inquiry; but there may be accidental corruptions and adulterations of a commodity, arising from natural or unavoidable causes, as when darnel or ergot become mixed with grain in the fields of the glovenly farmer, or when an article becomes changed and deteriorated from spontaneous decay, or when mineral matters and other impurities are accidentally derived from the machinery or vessels in which the thing is prepared or kept. The recognition of such impurities, and the tracing of them to their source, is of prime importance in pursuing a charge of adulteration. Few articles of commerce, however, are exempt from fraudulent adulteration, and the practice of it has grown with the competition of trade, and the removal of those wholesome restrictions which in former times were so energetically opposed to all kinds of dishonest dealing; for the guilds and companies of all large cities had their corporate regulations for supervising and governing every description of trade and manufacture. The excise, too, including the customs, had until recently control over the quality of all exciseable articles; and although the prime object of this was to protect the revenue of the country, yet it also served to prevent adulteration. In addition to this there were in ancient times ordinances of assize for regulating the price and quality of the common necessities of life. As far back as the reign of John (1203) there was a proclamation throughout the kingdom for enforcing the legal obligations of assize as regards bread; and in the following reign the statute (51 Hen. III. stat. 6), entitled the Pillory and Tumbrel, was framed for the express purpose of protecting the public from the dishonest dealings of bakers, vintners, brewers, butchers, and others. This statute is deserving of notice as the first in which the adulteration of human food is specially noticed and prohibited; and it seems to have been enforced with more or less of rigour until the time of Anne, when it was repealed (8 Anne, c. 19). According to *Liber Albus*, it was strictly observed in the days of Edward I., for it states that "if any default shall be found in the bread of a baker in the city, the first time, let him be drawn upon a hurdle from the Guildhall to his own house through the great street where there be most people assembled, and through the great streets which are most dirty, with the faulty loaf hanging from his neck; if a second time he shall be found committing the same offence, let him be drawn from the Guildhall through the great street of Cheepe, in the manner aforesaid, to the pillory, and let him be put upon the pillory, and remain there at least one hour in the day; and the third time that such default shall be found, he shall be drawn, and the oven shall be pulled down, and the baker made to forswear the trade in the city for ever." Vintners, spicers, grocers, butchers, regrators, and others, were subject to the like punishment for dishonesty in their commercial dealings—it being thought that the pillory, by appealing to the sense of shame, was far more deterrent of such

crimes than fine or imprisonment. But all this has given way to the force of free trade, and now the practice of adulteration has become an art, in which the knowledge of science and the ingenuity of trade are freely exercised. Fifty years ago it attracted the attention of one of the most expert chemists of the day, Mr Accum, who, in his *Treatise on Adulterations of Food, and Culinary Poisons*, declared it to be an "art and mystery." Subsequently to that, in 1851 and the three following years, articles on the adulteration of food appeared in the *Lancet*, and the effect of those articles was to call for a Parliamentary inquiry, which resulted in the Adulteration of Food Act of 1860. That Act of Parliament gave power to certain local authorities in England, Scotland, and Ireland to appoint analysts, having competent medical, chemical, and microscopical knowledge. The penalty for selling an adulterated article, knowing it to be so adulterated, was five pounds, and the costs of the proceedings. But as the statute was permissive, only a few analysts were appointed, and it soon became a dead letter. Attempts were subsequently made to improve the law, and to make it compulsory on local authorities to appoint analysts. One of these was the Bill of 1869, and another was that of 1871—both of which were abandoned by their promoters. In the year 1872, however, an Act was passed, entitled An Act to amend the Laws for the Prevention of Adulteration of Food, Drink, and Drugs. The main features of this Act are the following:—Local authorities in England, Scotland, and Ireland are bound to appoint analysts with competent medical, chemical, and microscopical knowledge. They must also appoint officers or inspectors to purchase articles of food, drink, and drugs within their respective districts, and take them to the analyst for examination. Other purchasers of such articles are permitted, under proper restrictions, to have suspected articles analysed. On receiving a certificate from the analyst, stating that any article is adulterated, the inspector must take the necessary legal proceedings for the purpose of bringing the offender to justice. The penalty on conviction of mixing anything whatever with a drug, with the view of adulterating it, or of mixing any injurious or poisonous ingredient with any article of food or drink, is a sum not exceeding fifty pounds, together with the costs; and for the second offence he shall be guilty of a misdemeanour, and be imprisoned for a period not exceeding six calendar months with hard labour. The penalty for selling an adulterated article with a guilty knowledge is a sum not exceeding twenty pounds, together with the costs; and for a second offence, the justice may order the offender's name, place of abode, and offence to be published in a newspaper, or in any manner he thinks fit, at the expense of the offender. Although the meaning of the term adulteration is not strictly defined in the Act, yet it is declared that the admixture of anything whatever with an article of food, drink, or drug, for the purpose of fraudulently increasing its weight or bulk, is an adulteration within the provisions of the Act. The adulteration of intoxicating liquors is provided for by the Licensing Act 1872 (35 and 36 Vict. c. 94); and in this Act there is a schedule of substances, called "*Deleterious Ingredients*," which are considered to be adulterations: they are *Coccus indicus*, chloride of sodium or common salt, copperas, opium, Indian hemp, strychnine, tobacco, darnel-seed, extract of logwood, salts of zinc or lead, alum, and any extract or compound of any of these. The execution of this Act rests with the police authorities and the Inland Revenue. The penalties for adulteration

are very severe, leaving it to the magistrate either to inflict a heavy fine or to send the offender to prison. In the year 1869 an Act was passed to prevent the adulteration of seeds, in fraud of Her Majesty's subjects, and to the great detriment of agriculture (32 and 33 Vict. c. 112), wherein it is declared that the killing of seeds, the dying of them, and the selling of such killed or dyed seeds, with intent to defraud, is punishable with a penalty not exceeding five pounds for the first offence, nor exceeding fifty pounds for a second or subsequent offence, together with the publication of the offender's name, place of abode, and offence in any manner that the justice thinks fit.

Adulteration in other countries is strictly prohibited under penal obligations. The Prussian penal code provides that any person selling adulterated or spoiled goods shall be liable to a penalty up to fifty dollars, or imprisonment for six weeks, with confiscation of goods; and it is not necessary to prove that the seller was aware of the adulteration. In Holland, the Dutch law is very similar to the code Napoleon, and inflicts a punishment of imprisonment for from six days to two years, with a fine of from 16 to 600 francs. The adulteration of bread with copperas or sulphate of zinc is dealt with by imprisonment of from two to five years, and a fine of from 200 to 500 florins. In Paris, malpractices connected with the adulteration of food are investigated by the Conseil de Salubrité and punished. Much valuable information concerning the adulteration of food, drink, and drugs in foreign countries has lately been obtained from the various British legations and consulates abroad, through a circular addressed to them from the Foreign Office. These investigations were commenced by the late Earl of Clarendon, and have been continued by Earl Granville. The results have been published in the *Food Journal* for 1870 and 1871; and they are epitomised at page 193 of the journal of the last mentioned date.

Among the adulterations which are practised for the purpose of fraudulently increasing the weight or bulk of an article are the following:—

1. *Adulterations of Milk*.—This is commonly effected by the addition of water—technically termed Simpson; and it is known by the appearance of the milk, the specific gravity of it, the quantity of cream which rises, and the chemical composition of the milk. Good milk has a rich appearance, and a full pleasant taste. Its specific gravity ranges from 1029 (water being 1000) to 1032—the average being 1030. If, therefore, the density of milk is above 1030, other conditions corresponding, the inference is that the sample is unusually good. Between 1028 and 1030 it is most probably genuine. At from 1026 to 1028 it is of doubtful quality, and below that, unless the amount of cream is enormously large, the sample is not genuine. An instrument, called a *galactometer*, has been constructed to show the specific gravity of milk at a glance; but it must always be remembered that while the addition of water tends to lower the gravity of milk, so also does the presence of much cream, and therefore a sample of skimmed milk may show a high gravity even when diluted with water. The percentage quantity of cream is ascertained by means of an instrument called a *lactometer*. It is a glass tube about 10 or 11 inches long and half an inch in diameter, graduated into 100 parts. Having shaken a sample of milk so as to diffuse the cream throughout its bulk, it is poured into the lactometer to the topmost division; and after standing for 12 hours, to allow the cream to rise, the proportion of it is read off from the divisions on the tube. Good milk shows a range of from 8 to 12 divisions. Conjoined with the preceding test, this affords reliable indication of the quality of the sample. After removing the cream, the gravity should be again taken, and this should not be lower than 1030. The chemical composition of milk varies to some

extent with the breed of the cow, its age, the diet upon which it is fed, the time of calving, and the time of milking; for afternoon milk is generally richer than morning, and the last drawn than the first. But taking the results of a large number of analyses by different chemists, it may be said that the average percentage composition of milk is as follows:—Casein or cheese matter, 3.64; butter, 3.55; milk, sugar or lactose, 4.70; saline matter, 0.81; and water, 87.30. If, therefore, 1000 grains of milk be treated with a few drops of acetic acid, and then heated in a flask to about 120° Fahr., the casein of the milk will curdle, and enclose within it all the butter. When it is quite cold, it can easily be filtered, and when dry, the curd and butter should weigh from 75 to 85 grains; and the serum or whey should have a density of about 1029. The addition of mineral matter, as common salt or carbonate of soda, to milk is easily recognised by an examination of the ash or saline constituents. 1000 grains of good milk evaporated to dryness will produce from 120 to 130 grains of solid matter, of which about 8 grains are mineral; and these are left in the platinum capsule, when the solid matter is incinerated or burnt to an ash. Of this ash about half is phosphate of lime, and 2.7 are alkaline chlorides, the rest being phosphates of magnesia and iron, with a little carbonate of soda. Any notable increase, therefore, in the proportion of ash, or any large diminution of it, will show adulteration. Colouring matter, as annatto, &c., is known by the peculiar tint of the milk; and starchy matters boiled to an emulsion will give their characteristic reactions with iodine, and will furnish a sediment which the microscope will reveal. Fatty emulsions, in imitation of milk, were used during the siege of Paris, on the recommendation of M. Dubrunfaut, who claims to have made a very perfect substitute by emulsifying fatty matter with an artificial whey or serum. This he did by dissolving from 40 to 50 grammes of saccharine matter (lactose, glucose, or cane sugar), and from 20 to 30 grammes of albumen (dried white of egg), and from 1 to 2 grammes of the crystals of carbonate of soda, in half a litre of water, and then emulsifying with from 50 to 60 grammes of olive oil or other fatty substance. This is best done at a temperature of from 120° to 140° Fahr.; and the liquid so prepared has the appearance of cream, and requires to be mixed with twice its volume of water to acquire the consistence of milk. Gelatine may be used instead of albumen, the mixture being even more nearly like rich cream than the former. M. Gaudin says that any kind of fat may be used for this purpose, provided it is purified with superheated steam; and M. Fan states that even horse grease may be so employed. M. Dumas, however, is of opinion that none of these substitutes can take the place of milk for any time as dietetical agents. Milk from diseased animals, especially those affected with pleuropneumonia, and the foot-and-mouth disease, is very unwholesome, and ought not to be drunk. The diseased product is recognised by the presence of abnormal inflammatory globules of the nature of pus, and by a large amount of epithelium cells. Preserved condensed milk is now so commonly used for food, that its properties when good should be known. 100 parts of the specimens at present in the market consist of from 14 to 18 parts of casein, from 12 to 14 of butter, from 44 to 52 of sugar, and from 2.4 to 2.7 of saline matter—making in all from 77 to 81 parts of solid matter—the rest, namely, from 23 to 19 parts, being water. It appears, therefore, that the concentration of the milk has been carried to about one-third of its original bulk, and that sugar has then been added, so that when diluted with twice its volume of water, it makes a sweet-tasting milk of ordinary strength. Good cream should contain from 25 to 34 parts of butter, about 5 of casein, 2 of sugar, 2 of saline matter, and from 62 to 56 parts of water.



2. *Coffee* has from very early times been the subject of sophistication. As far back as 1725, the Act 2 Geo. I. c. 30, took cognizance of the practice, and rendered it penal. In 1803 it was the object of very decisive measures, for by 43 Geo. III. c. 129, the officers of excise were empowered to search for, and to seize any burnt, scorched, or roasted peas, beans, or other grains or vegetable substance prepared in imitation of coffee; and any person manufacturing or selling the same was liable to a penalty of £100; gradually, however, it was found that use of torrefied vegetables in lieu of coffee, was becoming general in spite of these restrictions, and, therefore, in 1822, the Legislature (3 Geo. IV. c. 53) thought it expedient to allow the manufacture and sale of scorched or roasted corn, peas, beans, or turnips, by persons who were not dealers or sellers of coffee or cocoa, provided the same was sold under license in a whole or unground condition, and in its proper name. The penalty for infraction of the law was £100 in the case of a dealer in coffee or cocoa, and £50 in that of a licensed dealer. At that time the use of chicory was not generally known in England, although it had long before been introduced into France as a substitute for coffee; and its use was encouraged by the first Napoleon, who thought thus to strike a blow at English commerce. It was also used in Belgium and the Netherlands, so that travellers who visited Paris, Brussels, or Amsterdam, became acquainted with the substitute, and gradually acquired a taste for it. About the year 1820 the first parcels of chicory were imported into this country, and it would seem that the public demand for it gradually increased; for in 1832 there was a minute of the Treasury nullifying the Acts of George III. and George IV., by allowing grocers and other dealers in coffee and cocoa to sell chicory, provided they did not mix it with coffee. At a later period even this restriction was withdrawn; for by the Treasury minute of 1840, dealers in coffee were permitted to sell a mixture of chicory and coffee, provided a duty of 6d. per lb. was paid on all the chicory imported for home consumption. The use of it being thus legalised, it rapidly came into favour, and English farmers found it profitable to cultivate the root, and to send it into commerce duty free. This roused the attention of the Government, for the duties on chicory and coffee began seriously to fall off. Even the quality of the coffee imported underwent a change; for instead of demanding the fine flavoured varieties, orders were given for a coarse and strong description of plantation coffee, which would stand a good deal of chicory, as the grocers phrased it. All this was brought to the notice of the Lords of the Treasury, and in 1852 they revoked the order of 1840. But so strong was the influence of the trade upon Government, that in the following year the offensive minute was withdrawn, and grocers were again permitted to sell mixtures of coffee and chicory, provided the packet was distinctly labelled "mixture of chicory and coffee." The Treasury even went so far in 1858 as to direct the Commissioners of Inland Revenue, not to object to licensed dealers in coffee keeping and selling mangel-wurzel or beet-root mixed with coffee, provided they observed the same conditions as those laid down in the Treasury minute of 1853 as to chicory and coffee. Up to this time the duty on chicory had been merely nominal; but it was gradually increased until, in 1863, it was equivalent to that levied on coffee, and thus the revenue was protected, while adulteration was encouraged. The extent to which this was practised may be gathered from the Annual Reports of Mr Phillips, the principal chemist of the Inland Revenue Laboratory. During the years 1856 to 1862 inclusive, when the dealers in coffee and chicory were visited by the officers of Excise, the average number of samples of coffee annually examined was 3053, and of these

90, or nearly 3 per cent. were adulterated—the range being from 5·1 per cent. in 1856, to 1·8 per cent. in 1862; and the quantity of chicory in the mixture averaged 24 per cent. In 1860 it was 29 per cent. Now, in all these cases the coffee was sold as pure coffee, with no label upon the package; but when the mixtures of chicory and coffee were asked for, 7·3 per cent. were improperly labelled, and the average proportions of chicory ranged from 39·8 per cent. in 1859, to 22·3 per cent. in 1862—the average for the seven years, before the duties were equalised, being 30·7 per cent. In some cases, however, it reached to nearly 90 per cent.—40 to 50 per cent. being common proportions; and to neutralise the peculiar sweetness, and the earthy flavours which such quantities of chicory induced, it was, and still is the practice, to add more or less of the bitter material called "finings," which is a preparation of burnt sugar or caramel. Even chicory itself is now the subject of adulteration with roasted corn, beans, lupin seeds, acorns, horse-chesnuts, peas, pulse (called "Hambro' powder"), mustard husks, coffee husks (called "fights"), and even spent coffee, besides various roots, as carrots, parsnips, mangel-wurzel, beet-root, dandelion, &c. It is even said that spent tan and dried bullocks' livers have been employed for the purpose. The tests for these adulterations are the appearances presented by the tissues of the various vegetables when examined under the microscope, and by the fact that infusion of chicory does not become discoloured when it is treated with iodine, as it contains no starchy matters. Ground coffee, also, is of such a greasy nature, from the presence of volatile oil, that when it is thrown upon water, it floats, and does not readily discolour the water; whereas, all the adulterating agents quickly sink in water, and give it a brown porter-like appearance. It is not difficult indeed to separate, in a rough way, the coffee from its adulterating matters by merely stirring a given weight of the mixture in a tumbler of cold water; after a few minutes, the coffee will be found upon the surface of the water, and the other things at the bottom of it. Chemical analysis also readily discovers the fraud. It might be thought that there was safety in purchasing the coffee-berries entire, but a very ingenious machine has been patented for the manufacture of spurious berries out of common vegetable substances.

3. *Tea*.—Formerly, when the supply of tea to this country was entirely under the control of the East India Company, the adulteration of it in China was rarely practised, as every shipment of it was carefully examined by experienced officers at Canton, who rejected all teas of spurious or doubtful character. At that time, therefore, the adulteration of tea was carried on after it was imported into this country, and there were many legislative enactments prohibiting the practice. By the Act 2 Geo. I. c. 3, every tea dealer was subject to a penalty of £100, if he was convicted of counterfeiting, altering, fabricating, or manufacturing tea, or mixing it with other leaves. Later still, the statutes of 4 Geo. II. c. 14, and 17 Geo. III. c. 29, and 4 Geo. IV. c. 14, dealt more precisely with the subject, and imposed other penalties. At that time the adulterations of tea were effected in a wholesale manner; for according to Mr Phillips, of the Inland Revenue Office, there were in London alone, in 1843, as many as eight manufactories in which the exhausted leaves, obtained from hotels, coffee-houses, and elsewhere, were redried, and faced with rose-pink and blacklead, in imitation of genuine tea. More recently, however, the adulteration of tea has been practised by the Chinese, who find no difficulty in disposing of any kind of spurious tea to English merchants at Canton and Shanghai, who ship it to this country, and lodge it in the bonded warehouses with all the formalities of an honourable transaction, knowing that the difficulties of convicting them under the Adulteration of Food Acts and

Nuisances Removal Acts are almost insurmountable; for, in the first place, the local sanitary authorities have no means of obtaining direct information of the existence of unsound or spurious tea, or other article of food or drink in bonded warehouses; and secondly, if such information reaches them indirectly, they have no legal right of entry for the purpose of examining the tea and taking samples. But supposing both of these difficulties have been surmounted, and the tea has been found on analysis to be spurious, there yet remain the difficulties of obtaining a justice's order for its condemnation, an order from the customs for its removal, and an order which will satisfy the requirements of the wharfinger in whose custody it has been placed. But besides these, there are the difficulties of proving the ownership of the article, and the guilty knowledge of the broker who sells it. In illustration of this, we may refer to the proceedings of the sanitary authorities of the city of London in their endeavour to suppress the importation and sale of spurious tea. In the month of March 1870, Dr Letheby, the food analyst for the city, reported that a large quantity of spurious tea had arrived in London from China, and was lodged in the bonded warehouses of the city. It was described as "Fine Moning Congou" from Shanghai; and it consisted of the redried leaves of exhausted tea, much of which had become putrid before drying. It appears to have been called in China "Ma-loo mixture"—Maloo being the name of the street where it was prepared, and along the sides of which heaps of this trash might often be seen drying in the sun, with dogs and pigs walking over it. Proceedings were taken under the Nuisance Removal Amendment Act (26 and 27 Vict. c. 117), for the purpose of obtaining an order for the condemnation and destruction of the tea; but it was argued for the defence—*1st*, That "tea" was not named in the Act of Parliament; *2d*, That it was not included under the term "vegetable;" *3d*, That it was not "food;" and *4th*, That being in a bonded warehouse, it was not "exposed for sale." The case, however, was so glaring that, after two days' hearing, an order was given by the justice for its destruction; but as a case was granted for the opinion of the Court of Queen's Bench, the order was suspended; and as the application to the Court was never made, the order is still in abeyance. In another case, where many chests of spurious "scented orange Pekoe siftings" were in bond, the order for its condemnation was refuted on the ground that there was not sufficient evidence of the so-called tea being unwholesome, notwithstanding that it was not above one-sixth its proper strength; that it had little or none of the active principles of tea; that it had an unpleasant odour and an acid taste; that a great portion of it was not tea at all, and that the rest of it was composed of exhausted tea leaves, with just enough good tea to give it a flavour. A like failure of justice occurred in the city in 1866, when measures were taken by the sanitary authorities to prevent the sale of about 350,000 lbs. of rotten and charred tea which had been saved from a fire at Beal's wharf. The adulterations practised by the Chinese are numerous; exhausted tea is redried and glazed in a very deceptive manner. Millions of pounds of leaves of different plants, other than tea, are gathered and mixed with it. Mineral matter too, in the form of china clay, fine sand, and iron filings, are ingeniously incorporated with the leaf before curling, so that as much as from 20 to 40 per cent. of impurity is thus mixed with it. The tests, however, for these adulterations are very simple. In the first place, there is the usual trade test of infusion: a quantity of tea, amounting to the weight of a sixpence, is put into a small covered cup, and infused with about four ounces of boiling water for ten minutes. The infusion is then poured off from the leaves, and is examined for colour,

taste, and odour—all of which are characteristic. The leaves, too, are examined for soundness, for colour, for size, and for special botanical properties. Impurities like iron filings, sand, or dirt, are easily seen among the leaves, or at the bottom of the cup; and when these are placed upon a coarse sieve and washed with water, the impurities pass through, and may be collected for examination. The leaves, too, betray by their coarseness and botanical characters, the nature and quality of the tea; for although the leaves of genuine tea differ much in size and form, yet their venation and general structure are very distinctive. Very young leaves are narrow, convoluted, and downy; those next in size and age have their edges delicately serrated, and the venation is scarcely perceptible; while those of larger size have the venation well marked, there being a series of loops along each side of the leaf extending from the mid-rib to the edge: the serrations also are stronger and deeper, beginning a short distance from the stem and running up the side of the leaf to the apex. In addition to this, the microscopic characters of the surface of the leaf are very characteristic. Further investigations of a chemical nature are sometimes needed to determine the question of adulteration; and these depend on the well-known composition of good tea. In different cases, according to the age of the leaf and its mode of treatment, the proportions of its chief constituents may vary; but in a general way it may be said that the average composition of tea is as follows:—Moisture from 6 to 10 per cent.; astringent matter (tannin), from 25 to 35; gum, from 6 to 7; albuminous matters, from 2 to 3; thein, from 2 to 3; mineral matters (ash), from 5 to 6; and ligneous or woody tissue, from 50 to 60 per cent. Green tea, which is generally made out of young leaves, contains the largest quantity of soluble matters; and these, when fully exhausted from the leaves by successive boiling in water, amount to from 25 to 35 per cent. of the weight of the tea. In ordinary cases, when the tea is merely infused in boiling water, it does not yield above 25 per cent. of extractive. Again, the ash of tea is very characteristic of its quality—old and spurious leaves, as well as tea adulterated with mineral matter, yielding more than 6 per cent. of ash. The chief constituents of the ash of good tea are potash and phosphoric acid, with a little lime, silica, and oxide of iron—there being but a trace of chlorine and sulphuric acid; whereas the ash of old and exhausted leaves contains but little potash and phosphoric acid, in proportion to the lime and silica; and in those cases where tea has been damaged by sea water, the amount of chloride is considerable. Iron filings in tea are easily discovered by means of a magnet, there being in some cases as much as 20 or 30 per cent. of this impurity. Even when incorporated with the leaf before rolling and glazing, the fraud is detected by the attraction of the tea to the magnet.

4. *Cocoa* in its natural state contains so much fatty matter (amounting to rather more than half its weight), that it has long been the practice to reduce it by means of sugar or farinaceous substances. The first of these preparations is called chocolate, and the latter is known by such names as granulated, flake, rock, soluble cocoa, &c. In some cases the mixture is adulterated with mineral matters, as oxide of iron, to give colour. These adulterations are recognised by the appearance and taste of the preparation, by its microscopic characters, by the colour and reaction of its solution, and by the proportions of fat and mineral matters in it.

5. *Bread*.—Especial care has been taken at all times to protect the public from the dishonest dealing of bakers. The assize of bread, for example, is a very ancient institution; for it was the subject of a proclamation in 1202, and it was the chief matter referred to in the notable statute of



the Pillory and Tumbrel (51 Henry III. stat. 16) already mentioned. In the city of London, according to "*Liber Albus*," the assize of bread was an important institution. It was always made immediately after the feast of St Michael in each year, and very specific instructions were given for the guidance of the four discreet men who were to perform it; for their decision regulated the business of the baker in respect of the price and quality of bread, &c., for the current year; and woe to him if he disregarded it—there being numerous instances in "*Liber Albus*" of the pillory and the thew in cases where bread had been found adulterated or of short weight. In the time of Anne, the assize of bread was still further regulated (8 Anne, c. 19), and in the year 1815 it was abolished by the statute 55 Geo. III. c. 99. Especial provision, however, was made to guard against the frauds of adulteration, for several Acts of Parliament, especially 31 Geo. II. c. 29 and 1 and 2 Geo. IV. c. 50, prohibited the use of alum and other spurious articles in bread under severe penalties. At the present time, the chief adulterations of bread are with alum or sulphate of copper for the purpose of giving solidity to the gluten of damaged or inferior flour, or with chalk or carbonate of soda to correct the acidity of such flour, or with boiled rice or potatoes to enable the bread to carry more water, and thus to produce a large number of loaves per sack of flour. In practice 100 lbs. of flour will make from 133 to 137 lbs. of bread, a good average being 136 lbs.; so that a sack of flour of 280 lbs. should yield 95 four-pound loaves. But the art of the baker is exercised to increase the number, and this is accomplished by hardening the gluten in the way already mentioned, or by means of a gummy mess of boiled rice, three or four pounds of which, when boiled for two or three hours in as many gallons of water, will make a sack of flour yield at least 100 four-pound loaves. Such bread, however, is always dropsical, and gets soft and sodden at the base on standing, and quickly becomes mouldy. A good loaf should have kindness of structure, being neither chaffy, nor flaky, nor crummy, nor sodden. It should also be sweet and agreeable to the palate and the nose, being neither sour nor mouldy. It should keep well, and be easily restored to freshness by heating it in a closed vessel. And a slice of it, subjected to a temperature of from 260° to 280° Fahr. should hardly be discoloured, and should not lose more than 37 or 38 per cent. of its weight. When steeped in water, it should give a milky, sweet solution, and not a ropy acid liquid. The recognition of alum and sulphate of copper in bread requires practice and skilful manipulation, it being surrounded with difficulties. The most easily applied process is that described by Mr Horsley. He makes a tincture of logwood, by digesting a quarter of an ounce of the freshly cut chips in five ounces of methylated spirit for eight hours, and filters. A teaspoonful of this tincture is put with a like quantity of a saturated solution of carbonate of ammonia into a wine-glassful of water; and the mixed solutions, which are of a pink colour, are then poured into a white-ware plate or dish. A slice of the suspected bread is allowed to soak in it for five minutes, after which it is placed upon a clear plate to drain, and, if alum be present, it will, in the course of an hour or two, acquire a blue colour; if the tint be greenish, it is a sign of sulphate of copper; whereas pure bread gradually loses its pink colour, but never becomes blue or green. The ash of bread will also furnish evidences of the presence of mineral impurities.

6. *Flour and other Farinaceous Matters.*—The tests for good flour are its sweetness and freedom from acidity and musty flavour. A given weight of the flour, say 500 grains, made into a stiff dough with water, and then carefully kneaded under a small stream of water, will yield

a tough elastic gluten, which, when baked in an oven, expands into a clean-looking ball of a rich brown colour, that weighs, when perfectly dry, not less than 50 grains. Bad flour makes a ropy-looking gluten, which is very difficult of manipulation, and is of a dirty brown colour when baked. The ash of flour should not exceed 2 per cent. Other farinaceous matters are recognised under the microscope by the peculiar form, and size, and marking of the individual granules. In this way, the adulterations of oat-meal with barley-meal, and of arrow-root with inferior starches, may be easily detected.

7. *Fatty Matters and Oils* are the subjects of frequent adulteration. Butter and lard, for example, are mixed with inferior fats, and with water, salt, and farina. Most of these impurities are seen when the sample of butter or lard is melted in a glass, and allowed to stand in a warm place for a few hours, when the pure fat will float as a transparent oil, while the water, salt, farina, &c., will subside to the bottom of the glass. Fresh butter generally contains a notable quantity of water, as from 12 to 13 per cent., and sometimes a little salt, and a trace of curd; but these should never exceed two per cent. in the aggregate. Foreign fats are recognised by the granular look of the butter, by its gritty feel, by its taste, and by its odour when warmed. Other tests for these impurities are the melting-point of the sample, and its solubility in a fixed quantity of ether at a temperature of 65° Fahr. 20 grains of the sample, treated with a fluid drachm of ether, in a closed test tube, will look slightly flocculent, and be almost entirely dissolved in the case of good butter; but it will be mealy and liniment-like with lard, granular with dripping, and almost solid with mutton fat. The melting point of different fats is as follows:—Horse grease, 140°, calf fat, 136°, mutton fat, 130°; beef fat, 99°; hog's lard, 81°; and butter, 80°.

Oils are adulterated with inferior kinds, and the fraud is detected by means of the specific gravity of the oil, and its chemical reactions when tested upon a white plate with a drop of concentrated sulphuric acid—the colour and its time of development being the indications of the quality of the oil. The specific gravity of the animal oils are as follows:—Neat-foot oil, 880; tallow oil, 900; dolphin oil, 918; cod-liver oil, 921 to 926; whale oil, 927; seal oil, 934; porpoise oil, 937. Among the vegetable oils the following are the most important:—Rape or colza oil, 913 to 916; olive oil, 918; filbert oil, 916; beech-nut, 922; walnut, 923; cotton-seed, 923 to 928; poppy, 924; sweet almond, 918 to 922; hazel-nut and hemp-seed, 926; and linseed, 634 to 936.

8. *Isinglass* is often adulterated with gelatine, the fraud being ingeniously contrived so as to retain to a large extent the well-known characters of genuine isinglass; but it may be recognised in the following way: immersed in cold water, the shreds of genuine isinglass become white and opaque like cotton threads, and they swell equally in all directions, whereas those of gelatine become transparent and ribbon-like. Isinglass dissolves completely in boiling water, and makes a slightly turbid solution, which has a faint fishy smell, and is without action on litmus paper; whereas gelatine leaves a quantity of insoluble matter, and the solution smells of glue, and has an acid reaction. Strong acetic acid swells up the shreds of isinglass, and renders them soft and gelatinous; but it hardens gelatine. And, lastly, the ash of genuine isinglass is very small in quantity, and has a reddish colour; whereas that of gelatine is bulky (weighing from 2 to 3 per cent.), and has a perfectly white appearance from the presence of calcareous salts. Genuine isinglass is produced from the swimming-bladder or sound of the sturgeon, but gelatine is a sort of clarified glue obtained from bones, clippings of hides, &c. Boussingault states that the Bouxwiller glue, which is prepared from the

bones of horses slaughtered at that establishment, is transparent, and nearly colourless, and is on that account much sought after by restaurateurs for making jellies. It enters largely, too, into the composition of French gelatine.

9. *Sugar*.—During the last ten or twelve years the manufacture of sugar from starch has been an important branch of industry. The product is sent into commerce under the names of glucose, saccharum, and British sugar; and although it is chiefly used for brewing purposes, it is also employed for adulterating brown sugar, and for making confectionary, jams, marmalades, and fruit jellies. In the year 1870, as much as 25,737 cwt. of this sugar was manufactured for home consumption, and since then the quantity has been increasing. It is produced from rice or other starch, by submitting it to the action of very dilute sulphuric acid at a boiling temperature—the acid being afterwards neutralised with lime, and the solution evaporated to the setting point. The crystals of grape sugar are very small, and are entirely without that sparkling character which distinguishes cane sugar. They are less soluble in water, but more so in alcohol, than cane sugar, and they have only about one-third the sweetening power. Boiled with a solution of caustic potash, they quickly produce a deep brown liquid, and they have the power of reducing the hydrated oxide of copper, when heated therewith in an alkaline solution. These characters are distinctive of it, and will serve to recognise it in the brown sugars of commerce.

10. *Mustard* is generally so acrid and powerful in its flavour that it is commonly diluted with flour, or other farinaceous matter, turmeric being added to improve its appearance. The mixture is recognised by means of the microscope, when the granules of starch and the colouring matters of turmeric are easily seen. Genuine mustard does not contain starch, and therefore does not become blue when it is treated with a solution of iodine.

11. *Spices*, as pepper, cinnamon, curry powder, ginger, cayenne, &c., are more or less the subjects of fraudulent adulteration, which can readily be detected by the microscope; and by an examination of the mineral constituents. Formerly, pepper was ground by the retail dealer, and then there was no excuse for the presence of adulterating agents; but in 1856, the wholesale dealer undertook the business of grinding, and from that time adulteration has been on the increase. In some cases, the article does not contain a trace of pepper, but is made up of gypsum, mustard husk, and a little starch. In the *Ninth Report of the Commissioners of Inland Revenue*, there is a statement by Mr Phillips, the chief chemist of the Excise, that he found a sample of so-called pepper containing 25 per cent. gypsum, the rest being mustard husks and a little cereal starch, without a trace of pepper. Another sample consisted of 16 per cent. gypsum, 44 mustard husks, a little cereal starch, and the rest pepper. Four other samples, closely resembling pepper, so as to deceive an inexperienced eye, were found to contain about 22 per cent. of gypsum, with sand, starch, and mustard husk. Linseed meal and powdered capsicums are likewise used for adulterating pepper. The chief sophistications of ginger powder are sago-meal, ground rice, and turmeric; while the colouring agents of curry powders and cayenne are ferruginous earths, brick dust, and even vermilion and red-lead. Spices, too, are sometimes exhausted of their active properties before they are ground and sold to the public.

12. *Beer, Ale, and Porter*.—The assize of ale is contemporaneous with that of bread, being described as the "*Assisa Panis et Cervisie*," in old documents. In the statute 51 Henry III. c. 16 (1266), they are spoken of as ancient and well-known institutions, the object of them being to regulate the quality and price of these articles.

The officers appointed to determine the goodness of ale were called "ale conners," or "ale tasters" (*gustatores cervisie*), and were elected annually in the court-leet of each manor, and in the city of London at the ward-mote, according to the advice and assent of the alderman and other reputable men of the ward. Very specific instructions are given in *Liber Albus* of the business of the brewer, and of the penalties for any default thereof—it being ordained that no ale should be sold without having been tasted and approved by the ale conners of the district. Even now these officers are elected in the city of London with the old formalities, but the real duty of examining the quality of ale, beer, and porter has for many years been in the hands of the Excise. As far back as the time of Anne there was a law prohibiting the use of *Cocculus indicus* or any unwholesome ingredient in the brewing of beer, under severe penalties, the brewer being restricted to the use of malt and hops alone; but gradually, as the taste for porter came into fashion (since 1730), and during the French war, when the price of malt was very high, certain colouring matters prepared from burnt sugar were allowed to be used, and this at last became so necessary to the trade, that it was legalised by the Act 51 Geo. III. c. 51. Five years after, however, it was prohibited by the statute 56 Geo. III. c. 58, which declared that after the 5th of July 1817, no brewer, or dealer, or retailer of beer, shall receive, or use, or have in his possession or custody, any liquor, extract, or other material or preparation, for the purpose of darkening the colour of worts or beer, other than brown malt. He was also prohibited from using molasses, honey, liquorice, vitriol, quassia, *Cocculus indicus*, grains of paradise, guinea pepper, or opium, or any extract or preparation of the same, or any substitute for malt or hops, under a penalty of £200; and no chemist or vendor of drugs was permitted to sell, send, or deliver any such things to a brewer or retailer of beer under a penalty of £500. Later still, in 1830, the Act for permitting the general sale of beer and cider by retail in England (1 Will. IV. c. 64), declares that if any person so licensed shall knowingly sell any beer, ale, or porter, made otherwise than from malt and hops, or shall mix, or cause to be admixed, any drugs or other pernicious ingredients with any beer sold in his house or premises, or shall fraudulently dilute or in any way adulterate any such beer, &c., shall for the first offence forfeit and pay a sum of from £10 to £20, and for the second offence shall be adjudged disqualified from selling beer, ale, or porter for two years, or forfeit a sum of from £20 to £50; and the same regulations applied to cider and perry. The execution of these acts rested with the Excise, and it would seem that three classes of adulterations were practised, namely, 1st, Those which gave fictitious strength to the beer, as *Cocculus indicus*, tobacco, opium, &c.; 2d, Those which improved the flavour and body of the beer, as grains of paradise, capsicum pods, ground ginger, coriander seeds, caraway seeds, sweet flag, liquorice, molasses, and salt; and, 3d, Those which gave bitterness, as quassia, chiretta, horehound, gentian, &c. In London the publicans were not in the habit of practising the first kind of adulteration, but confined themselves to the second and third. In the country, however, according to Mr Phillips, it was quite otherwise, especially with brewers who retailed their own beer; for he found that they frequently used tobacco and *Cocculus indicus*. He even thinks that the cases of brutal and purposeless violence which were so often recorded were referable to the maddening influence of these ingredients. By the Act 24 and 25 Vict. c. 22 (1863), when the duty on hops was relieved, these bitters and substitutes were permitted, and so also was sugar, provided the full duty of 12s. 8d. per cwt. was paid upon it. Later still, by the Licensing Act 1872 (35



and 36 Vict. c. 94), provision is made to protect the public from the adulteration of beer; for it prohibits the possession, sale, or use of beer adulterated with *Cocculus indicus*, chloride of sodium (otherwise common salt), coperas, opium, Indian hemp, strychnine, tobacco, darnel-seed, extract of logwood, salts of zinc or lead, alum, and any extract or compound thereof, under a penalty of £200 for the first offence, and £100 for the second offence, together with disqualification of both the dealer and the house for a certain period. The police and the officers of Inland Revenue are empowered to search for and obtain samples of such beer, and the analyst is a person appointed by the Excise. The tests for the adulteration of beer, ale, and porter, are not easily applied except by a skilled chemist; but it may be said that the chief qualities of good beer are its density, sweetness, spirituousity, piquancy, flavour, and frothiness. The density of ale and beer ranges from 1008 to 1020 (water being 1000)—the average being 1015; and in the case of porter it ranges from 1015 to 1020. The amount of alcohol in these beverages ranges from 5 to 9 per cent., the average being about 7. The solid extract is from 4 to 6 per cent., and the ash or mineral matter is from 0.2 to 0.3 per cent. very little of which should be common salt.

13. *Malt*.—The Excise do not permit malt to be adulterated with ungerminated grain; but it is very difficult to determine whether the presence of these grains is accidental or otherwise, as in some wet seasons when barley is badly stacked it will heat or become mouldy, and the grains will lose their vitality. Even if the grain is dried artificially at a temperature of from 140° to 150° Fahr., the vitality of the seed will be destroyed. In some seasons as much as from 34 to 70 per cent. of the grain will be killed. Roasted unmalting grain, instead of the malted, is prohibited by 19 and 20 Vict. c. 34, but there is no doubt that the substitution is largely practised.

14. *Wine and Spirits*.—The denunciations in the Scripture against the use of mixed wine have reference, in all probability, to wines which were fortified or adulterated with stimulating and intoxicating herbs. In this country measures were taken at a very early period to prevent the sale of unsound and unwholesome wine. The Vintners' Company, for example, which was incorporated in the reign of Edward the Third, under the name of the "*Wine Tonnors*," had control over the price and purity of the article, there being chosen every year "persons of the most sufficient, most true, and most cunning of the craft (that hold no taverns)," who were to see to the condition of all wines sold by retail, and who were to govern the taverners in all their proceedings. Bad or adulterated wine was thrown into the gutters, and the possessors thereof were set in the pillory. It would seem that the wine which was most adulterated was that called Gascoign; for in the tenth year of the reign of Henry the Sixth (1432), there was a petition to the king on the subject, praying him to amend the same. Stowe, in fact, says "that in the 6th of Henry VI, the Lombardes corrupting their sweete wines, when the knowledge thereof came to John Ranwell, maior of London, he, in divers places of the cite, commanded the heades of the butts and other vessels in the open streetes to be broken, to the number of fifty, so that the liquor running forth passed through the cite like a stream of raine water, in the sight of all the people, from whence there issued a most loathsome savour." In modern times the art of adulterating wine has been brought to great perfection; for it consists not merely in the blending of wines of different countries and vintages, but in the use of materials which are entirely foreign to the grape. Port wine, for example, is manufactured from Beni Carlos, Figuerna, and red Cape, with a touch of Mountain to soften the mixture and give it richness—

the body and flavour being produced by gum-dragon, and the colour by "*berry-dye*," which is a preparation of German bilberries. To this is added the washings of brandy casks ("*brandy cove*") and a little salt of tartar to form a crust. Sherry of the brown kind and of low price is mingled with Cape and cheap brandy, and is flavoured with "*brandy-cowe*," sugar-candy, and bitter almonds. If the colour be too high it is lowered by means of blood, and softness is imparted to it by gum-benzoin. Pale sherries are produced by means of plaster of Paris or gypsum, by a process called "*plastering*," and the effect of it is to remove the natural acids (tartaric and malic), as well as the colour of the wine. In this way a pale, dry, bitter, and sub-acid wine is produced, charged with the sulphates of lime and potash. Large quantities of what are called clarets are manufactured in this country from inferior French wine and rough cider, the colour being imparted to it by turnsol or cochineal. Madeira is produced from Vidonia with a little Mountain and Cape, to which are added bitter almonds and sugar. Even Vidonia and Cape are adulterated with cider and rum—carbonate of soda being used to correct the acidity. Common Sicilian wine is transformed into Tokay, Malaga, and Lachryma Christi. Champagne is produced from rhubarb stalks, gooseberries, and sugar, the product being largely consumed at balls, races, masquerades, and public dinners. Of late, too, since the investigations of Petiot, Thenard, Gall, Hussman, and others, the manufacture of wine from sugar and the refuse husk or mark of the grape has been largely practised, inasmuch that a great part of the wine of France and Germany has ceased to be the juice of the grape at all. In point of fact, the processes of blending, softening, fortifying, sweetening, plastering, &c., &c., are carried on to such an extent that it is hardly possible to obtain a sample of genuine wine, even at first hand; and books are written on the subject, in which the plainest directions are given for the fabrication of every kind of wine, there being druggists called "*brewers' druggists*," who supply the agents of adulteration. These are as follow:—Elderberry, logwood, brazil-wood, red saunders-wood, eudbear, red beet-root, &c., for colour; litharge, lime or carbonate of lime, carbonate of soda, and carbonate of potash, to correct acidity; catechu, logwood, aloe-leaves, and oak-bark, for astringency; sulphate of lime, gypsum, or Spanish earth, and alum for removing colour; cane sugar for giving sweetness and body; glucose or starch sugar for artificial wine; alcohol for fortifying; and ether, especially acetic ether, for giving bouquet and flavour. The tests for these agents are not readily applied, except by the professional chemist; but they are promptly recognised by the stomach and the brain, for good wine, though it may intoxicate, rarely leaves a disagreeable impression. In a general way, it may be said that the specific gravity of genuine wine ranges from 991 to 997; and the amount of alcohol in it never exceeds 20 per cent. by volume. The solid residue in it, when evaporated to perfect dryness, amounts to from 1.33 to 2.15 per cent. in Rhine wines, and in the light wines of France; to from 2.85 to 3.73 per cent. in Teneriffe and Cape; to from 3.49 to 4.54 per cent. in sherry and Madeira; and to from 3.75 to 5.24 in port. Sweet wines, as Lachryma Christi, Muscat, Malaga, Tokay, Bergerac, champagne, and the wines of the Palatinate, contain a much larger percentage of solid matter in them. The ash, or involatile constituents of wine, should range between 0.19 and 0.5 per cent. It should be strongly alkaline, and should consist of carbonate, sulphate, and phosphate of potash, chloride of sodium, carbonate of lime, and a little alumina. As a distinctive mark of genuine wine, the ash is of the greatest value. Again, pure wine gives but slight precipitates with oxalate of ammonia, with acid nitrate of silver, and acid nitrate of baryta. The

colouring matters of wine may be separated and analysed by the process of Mulder, which is too elaborate for description in this place, and so also are the tests for recognising spurious colours, as the test of Vogel, Jacob, and others (solutions of acetate of lead), that of Pelouze and Frenny (basic acetate of lead); of Ness von Esenbeck (solutions of alum and of carbonate of potash); of Batilliat (ammonia); of Filhol (ammonia and sulphide of ammonium); and others. At present, the spectroscope has not furnished, as was expected, any very reliable indications of the nature of the colouring matters of wine. In fact, the whole subject requires fuller investigation. The adulteration of spirits consists mostly in the addition of water and in the use of inferior spirit, recipes being given in the *Publican's Guide*, and other such books, for what is called making up spirits for sale. The recognition of these frauds rests with the Excise, under the Act 35 and 36 Vict. c. 94.

15. *Tobacco and Snuff*.—The adulteration of these articles is prohibited and otherwise provided for by the statutes 5 and 6 Vict. c. 93, and 25 and 26 Vict. c. 7, and 30 and 31 Vict. c. 90, manufacturers of tobacco and snuff being prohibited from using or having in their possession sugar, honey, molasses, treacle, leaves, herbs, or plants, powdered wood, moss, weeds, sea-weeds, or any ground or unground roasted grain, chicory, lime, sand, umbre, ochre, or other earths, nor anything capable of being used to increase the weight of tobacco or snuff, under a penalty of £200—water alone being allowed in the manufacture of tobacco; and water, salt, and alkaline salts, as well as lime in the manufacture of snuffs, under a penalty of £300. But it appears from the reports of the Commissioners of Inland Revenue, that the adulteration of tobacco and snuff is still largely practised. Tobacco is adulterated with molasses, sugar, aloes, liquorice, gum, catechu, oil and lamp-black, alum, tannic acid and iron, logwood, and such leaves as rhubarb, chicory, cabbage, burdock, colts-foot, and excess of salt and water. In the year 1862 it was discovered that certain Irish manufacturers were adulterating their Cavendish and roll-tobacco with liquorice, in imitation of the sweetened Cavendish of North America, and therefore in 1863 the practice was legalised in the case of Cavendish and negro-head by the Manufactured Tobacco Act, 1863. Snuffs are adulterated with excess of alkaline salts, lime, sand, ferruginous earths, fustic, torrefied oatmeal, peat-moss, ground velonia cups, bichromate of potash, and chromate of lead. Mr Phillips states, in the *Fourth Report of the Commissioners of Inland Revenue*, that up to 1856 the practice of adulterating snuff was very prevalent, particularly in Ireland—52 per cent. of the samples analysed being found to be illicit; in 1858 and subsequently, however, the proportion has been much less. These adulterations are recognised by drying the sample, and noting the loss of weight, and by the amount and nature of the ash left on incineration. Foreign leaves, &c., are discovered by the aid of the microscope.

16. Among the adulterations which are practised for the purpose of improving the appearance of the article, and giving it a false strength, are the following:—The addition of *alum or sulphate of copper* to bread; the facing of black tea with *black lead*, and of green with a mixture of *indigo* or *Prussian blue* with *turmeric* and *china clay*; the treatment of pickles and preserved fruits with a *salt of copper*, which has the property of mordanting and brightening the green colouring matter of vegetables. In some cases the quantity of copper has been so large as to give a coppery appearance to a steel knife or fork kept in the pickle; but at all times the metal may be discovered by the pink colour of the ash, and by its becoming blue when treated with a little strong ammonia. *Ferruginous earths* are added to sauces, anchovies, potted meats, and the preparations of

cocoa. This also is recognised by the amount and colour of the ash. *Mineral pigments*, as yellow and orange *chromate of lead*, green *arsenite of copper*, &c., are frequently used in colouring confectionery, and have produced serious results to those who have eaten it. Lastly, with a view of giving false strength to the article, *sulphuric acid* has been added to vinegar and lime-juice; *black jack* or *burnt sugar* to coffee and chicory; *catechu* or *terra japonica* to exhausted tea; *Cocculus indicus* to beer and porter; cayenne and mustard husks to pepper, &c.

• 17. Adulterations are also practised for the purpose of debasing the article, as when the cream is taken from milk by the process of skimming; or when the active principles of spices, &c., have been removed by distillation.

18. Accidental adulterations may occur from the admixture of darnel or ergot with flour; siliceous and earthy matters with substances that are ground in a mill; mould or acari with flour, sugar, cheese, &c.; and copper, zinc, or lead may be accidentally derived from the vessels in which any acid substance or liquid has been prepared or kept. In this manner cider and wine have become tainted with lead; sour milk with zinc; and jellies, jams, and preserves with copper.

19. *Adulteration of Cattle Foods*.—In a recent trial, where the question of adulteration was raised, a linseed-cake maker stated in evidence that his ordinary oil-cake consisted of 50 parts ground sesamé cake, 20 parts of bran, and 30 of linseed and linseed giftings. To prevent the detection of this fraud by an examination of the cake with the naked eye, it is customary to powder the materials very fine by means of a machine called a "Buffein machine," after which they are thoroughly mixed together and pressed into a cake. It would seem, indeed, that pure linseed cake is not saleable, except in a few localities, as in the neighbourhood of Gainsborough, and in the agricultural centres of Lincolnshire and Norfolk, where the genuine cake is appreciated. Elsewhere the adulterated article commands a ready sale, on account of its low price; and thus encouragement is given to the use of all sorts of adulterating agents, as earth-nut, cotton, beech, and sesamé bran, rice-husks, oat-dust, and other such worthless matter. Very recently this important subject has been treated by Dr Voelcker in a paper "On the Characters of Pure and Mixed Linseed Cakes," which was published in the *Journal of the Royal Agricultural Society of England* (vol. ix. part 1). Some of the impurities of linseed cake may be due to the accidental presence of the seeds of various weeds and wild plants, which the careless farmer has allowed to grow upon his land. Most of these, however, are easily removed by one or two siftings, as in the case with clean linseed; but the siftings are not thrown away; they are used for adulterating other samples of linseed—making the second, third, and even fourth qualities of Riga and St Petersburg seed. Occasionally the siftings are sent out to sea in barges to meet the vessels coming from the north with linseed on board; there the mixture is made; and when the vessels reach the port for which they are destined, the cargo is sold for genuine linseed "as imported." But besides these impurities, the linseed cake of commerce contains a large proportion of other cakes, as rape, earth-nut, decorticated and undecorticated cotton seed, beech-nut, hemp-seed, cocoa-nut, cocoa, palm-nut, palm-kernels, niger seed; sesamé or teal seed, poppy, castor oil, bassia, curcas, indigo seed, olive, &c., besides bran, acorns, careb-beans, and the husks or shades of earth-nut, oats, barley, rice, and other refuse. Some of these things are actually poisonous to cattle, as in the case of castor-oil cake, curcas bean, purging flax, wild mustard, wild radish, &c.; others are of doubtful quality, as corn cockle, darnel, indigo seed, earth-nut, &c.; and many are disagreeable to the taste, on



account of rancidity and other properties, as cocoa-nut cake, palm-nut cake, bassia cake, &c.; while many are so charged with woody matters as to be indigestible and irritating in their action, as cotton, olive, palm-nut, husks of rice, cocoa-nut fibre, saw-dust, &c. These impurities are sometimes easily recognised by the naked eye, or by a lens of low power. At other times the colour of the cake is an indication of its impurity. The taste of it also is frequently characteristic; for while linseed has a sweet mucilaginous taste, rape seed is turnip, mustard acrid, dodder like garlic, bassia bitter, &c. Then, again, the action of a little warm water will develop the flavour of impurities—rape giving off a strong odour of turnip, mustard its well-known acrid flavour, wild radish and other impurities their characteristic smells. When examined chemically it is found that adulterated and dirty cakes show a deficiency of oil and albuminous matter, and a large excess of woody fibre and mineral substance. In good cake the moisture ranges from 10 to 14 per cent., the oil from 10 to 15, the albuminous matter from 25 to 35, the mucilage, sugar, and digestible fibre to from 20 to 30 per cent., the woody fibre to from 9 to 14, and the mineral matter or ash to from 6 to 8 per cent. Cake that has been shipped too fresh is apt to heat and become mouldy; in which case it will lose its fine aroma, and be of inferior quality: it may even be injurious to animals feeding on it.

20. *The Adulteration of Seeds*, in fraud of her Majesty's subjects, and to the great detriment of agriculture, has been provided for by the Act 32 and 33 Vict. c. 112, wherein it is prohibited to kill, dye, or to sulphur seeds, or any way to give them a false appearance, under a penalty of £5 for the first offence, and £50 for the second. But for all this extensive frauds are practised: turnip seed is adulterated with rape, wild mustard or charlock, the vitality of which has been destroyed by kiln-drying at a high temperature; old turnip seed (kiln-dried) is also used for diluting fresh seed; and it is notorious that such seed can be obtained in commerce by the ton. Again, clover seed is often killed and dyed—one of the commonest frauds being to dye trefoil, and to sell it for red clover; the pinkish or yellowish-brown tint and metallic look being given with a weak solution of logwood and alum, or with a strong solution of logwood alone, and then it is shaken up with a little black lead. Another trick is to dye white clover seed with a weak solution of indigo, and thus to make it look like hybrid clover which has a bluish-green colour. When trefoil and white clover seed have become changed by age and have lost their yellowish colour, they are dyed with infusion of turmeric, and then toned down with the fumes of burning sulphur; in fact, these fumes are used to brighten up all sorts of seeds that have become brown by keeping, but they destroy the vitality of the seed.

21. *Adulteration of Drugs*.—This at all times has been considered a serious offence. In the city of London, the president and censors of the College of Physicians have power to search for apothecaries' wares, drugs, and stuffs, and on finding them defective, corrupted, and not meet nor convenient to be ministered in any medicines for the health of man's body, they are to destroy them, and are to correct and punish the offenders by committing them to prison, and amercing them in a penalty not exceeding £20. These wholesome powers were granted to the college by the Acts 14 and 15 Hen. VIII. c. 5, and 32 Hen. VIII. c. 40, and 2 Mary. c. 9; but although they are still in force, and might be advantageously exercised, yet they have long since fallen into disuse; and if it had not been for the laudable efforts of the Pharmaceutical Society of Great Britain, there would have been no practical remedy for the adulteration of drugs. The Society was founded in 1841, for the purpose of advancing

the status and education of those who were engaged in the preparation and sale of medicines, and it was incorporated by Royal Charter in 1843. A few years after, in 1852, the qualifications of pharmaceutical chemists were regulated by Act of Parliament (15 and 16 Vict. c. 56), and in 1868 it was further provided, by the 31 and 32 Vict. c. 121, that no person should be permitted to engage in the sale or dispensing of medicines, or to use the title of chemist and druggist, or dispensing chemist, or pharmacist, without being duly qualified, and registered as a pharmaceutical chemist. The adulteration of medicine was also prohibited by the incorporation of the Adulteration of Food and Drink Act 1860 (23 and 24 Vict. c. 84), it being declared that such adulteration should be deemed an admixture injurious to health. More recently, in 1872, the Act 35 and 36 Vict. c. 74, renders it penal for any one to adulterate a drug for sale, or to sell such drug. In the first case the penalty is a sum not exceeding £50, together with the costs of the conviction; and for a second offence he shall be guilty of a misdemeanour, and be imprisoned for a period not exceeding six calendar months, with hard labour. In the second case, the seller of an adulterated drug is subject to a penalty not exceeding £20, together with costs; and for a second offence he shall have his name, place of abode, and offence published in any manner that the justice thinks fit. The chief adulterations and debasing of drugs are the following:—In the case of vegetable substances, as jalap, opium, rhubarb, cinchona bark, &c., foreign substances are added to make up for the loss of weight in drying and powdering, there being in many cases a trade allowance of only four per cent. for such loss, whereas in almost all cases it exceeds this. Roots, seeds, and barks, for example, lose from 6 to 9 per cent., scammony 7 per cent., aloes 9, sarsaparilla 10, squills 12, and opium from 15 to 25 per cent. At other times foreign substances are added to assist the grinding, or to improve the appearance of the article. Occasionally the active principles are removed, or the medicine has become worthless from keeping or from faulty preparation. In the case of the alkaloids, inert substances, as sugar, starch, gum, &c., are mixed with them to increase their weight and bulk. Lastly, the activity of a vegetable drug may greatly depend on its mode and place of culture. With respect to mineral preparations, there is even a still larger field for adulteration, inasmuch that the purity of the article is entirely regulated by the wholesale price of it. Again, directly after the Act of 1856 (18 and 19 Vict. c. 38), which permitted the sale of methylated spirit—that is, inferior spirit mixed with wood-naphtha, duty free for manufacturing purposes—advantage was taken of it by many chemists and druggists, and the cheap spirit was used for making tinctures and other medicinal preparations. This, however, came at last to be so serious and dangerous a practice, and was withal so great a fraud on the revenue, that means were taken to suppress it by the Act 29 and 30 Vict. c. 64, wherein it is provided that such spirit shall not be used in any medicinal preparation, except in the manufacture of chloroform, ether, and the vegetable alkaloids, or in the preparation of other things whereby the spirit was afterwards entirely dissipated. But Mr Phillips remarks, in the *Ninth Report of the Commissioners of Inland Revenue*, that a few instances have been discovered of the sale of drinks under the names of "Indiana brandies," "medicated whiskeys," "pure Islay mountain," "Indian tincture," &c., the exciting principle of all of which was found to be hyponitrous ether prepared from methylated spirit. In the case of a drink called "Hollands whiskee," it was produced by distilling the methylated spirit with a little nitric acid, and then sweetening with treacle, and flavouring with rhubarb, chloroform.

fenugreek, &c., so as to conceal its real character; and notwithstanding its disagreeable flavour, it got into public favour in some districts, especially in Ireland, and was largely sold as a cheap means of producing intoxication.

22. *The Adulteration of Textile Fabrics.*—Woollen goods have for years past been largely adulterated with refuse fibres called "shoddy" or "mingo." The practice was denounced by Latimer in one of his sermons at Paul's Cross, preached before king Edward in 1635, wherein he spoke of it as the devil's artifice, saying that they were wont to make beds of flock, but now they had turned it into dust, which he aptly called "Devil's dust," and that the cloth worker did so incorporate it to the cloth that it was wonderful to see. The practice is still in vogue, for there is hardly a piece of cheap cloth without it. Shoddy as originally used was merely the fluff or waste from the looms, but now it consists of any kind of woollen rubbish, as old blankets, stockings, &c., pulled to pieces in a machine called the "Devil." Mingo is even a shorter description of fibre, and is made in the same way from old rags. No less than forty millions of pounds of these are made annually in Yorkshire, at an estimated value of eight millions sterling, and all of it is used for adulterating woollen cloth. There is even another kind of refuse called "extract," which is employed for the same purpose. It consists of the wool obtained from the rags of mixed goods; that is, goods which have a cotton or linen warp blended with wool. The cotton is destroyed by chemical agency, chiefly by means of dilute sulphuric acid, and the wool is left intact.

The cotton fabrics and gray goods of Lancashire and Yorkshire are largely adulterated with size and china clay, the object being to give them increased weight and substance. Up to about twenty years ago the sizing of cotton goods was effected with a mixture of fermented flour, paste, and tallow, by which means the tenacity of the warp was increased and the friction of weaving was lessened. To effect this about 20 per cent. of size was used; but in 1854, when tallow became dear in consequence of the Russian war, a substitute was found in china clay. Later still in 1862, when the cotton famine began to be felt, and the long-fibred American cotton grew scarce, it was found necessary to give tenacity to the twist made from shorter fibre by using more size. In this manner as much as from 50 to 90 per cent. of size has got to be used, the greater part of it being china clay, with a certain proportion of hygroscopic matter, such as chloride of magnesium, to keep the material damp and supple. The impurity is easily detected by washing the cloth, and ascertaining the loss of weight before and after the operation. Cheap calicoes are also largely impregnated with lime, which has been used in the process of bleaching, and left in them. A cloud of dust flies out of such fabrics when they are torn. Silk also is made heavier and stouter by the incorporation of dye stuffs used expressly for the purpose. This is generally the case with dark-coloured silks, black and brown, as lighter shades will hardly admit of it; as much indeed as half the weight of the silk may be thus incorporated with it.

23. *Falsification of Coin and Precious Metals.*—In Anglo-Saxon times the debasing or counterfeiting of coin was punished by the loss of the hand. In later times it has been criminal in the highest degree. By the statute 24 and 25 Vict. c. 99, the counterfeiting of gold or silver coin is felony, and in Scotland is a high crime and offence. Hardly less severe is the punishment for debasing, diminishing, lightening, or impairing the value of the current coin of the realm; and very effectual means are taken to secure their standard value when put into circulation. In the first place, an officer is appointed by the Crown to superintend the coinage, and to be answerable for its goodness.

(See MINT and COINAGE.) In the second place, the coin is tested, as to its weight and fineness, by persons skilled in the goldsmith's craft. (See ASSAY.) But notwithstanding this, the coins of the realm, as issued from the mint, have often been debased to a considerable extent; for, according to Lord Liverpool, the total debasement of the silver money of this country, from the time of the Conquest to the reign of Elizabeth, was not less than 65 per cent. It is notorious that in Spain, Austria, and Turkey the degradation of the silver coin, even at the present time, is carried to a serious extent. By the Coinage Act 1870 (33 and 34 Vict. c. 10) the composition and weight of all the coins of this country are strictly provided for; and in the case of gold coin, the limits or "remedy" of fineness and weight are exceedingly narrow. The composition of the coin is fixed at eleven-twelfths fine gold, and one-twelfth alloy (copper); so that in 1000 parts of our gold coin there are 916·66 parts of fine gold. This is called its millesimal fineness, and the allowance for error in composition is limited to 0·002 per 1000 parts. The weight of the sovereign is fixed at 123·27447 grains, and the limit of error in weight is the 0·2 of a grain; and in proportion with all other gold coins. In the case of silver coins, the composition is thirty-seven fortieths of fine silver, and three-fortieths of alloy (copper)—the millesimal fineness being therefore 925 parts of silver; the remedy or allowance of fineness is just twice that of gold—namely, 0·004 per 1000 parts. The weight of the silver coin is at the rate of 87·27272 grains per shilling of value; and the remedy or allowance of error is confined to 0·36363 of a grain per shilling. Lastly, the bronze coinage of the country consists of 95 parts copper, 4 tin, and 1 zinc: the weight of a penny being 145·83333 grains; and the allowance for error is 2·91666 grains per penny. The specific gravity of the several descriptions of coin is 17·53 for gold, 10·35 for silver, and 8·89 for bronze. So accurate are the composition and weight of the coins issued from the mint at the present time, that at the last trial of the "Pyx" in July 1871, the jury reported that every piece separately examined (representing many millions sterling) was found to be accurately coined in regard to weight and fineness. In the case of the gold coin, the fineness ranged from 916·2 to 917 parts per 1000. These, indeed, were the extremes of only 2·66 per cent. of the coins examined, the great bulk of them, namely 72·65 per cent. having a fineness of from 916·5 to 916·7 per 1000. Now, when it is considered that the composition of an alloy of gold and copper can be ascertained to the one-ten thousandth part, and that the delicacy of a balance is to the thousandth part of a grain, it must be evident that the accuracy and perfection of coining in this country are remarkably precise. As, however, the weight of gold and silver coin must become less by continual wear, the Acts 22 and 25 Vict. c. 99, and 33 and 34 Vict. c. 10 provide for it. It does not appear that the practice of debasing coin is carried on to any great extent in this country; for in the second Annual Report of the Deputy-Master of the Mint (1871), the chemist of the Mint (Mr W. Chandler Roberts) says that only two sovereigns were submitted to him, the weight of which had been fraudulently reduced by means of a solvent, aided by electricity. In former times, however, the process of "sweating" was very frequently employed.

The adulteration of precious metals was prohibited and provided for by the rules and regulations of the various guilds and corporations which took cognizance of the goldsmiths' craft. As early as the 26th of Henry II. (1180) the Goldsmiths' Company of London was founded, and in 1327, when it was incorporated, it was invested with the privilege and power of inspecting, trying, and regulating all gold and silver wares throughout the king-



dom, and of punishing all offenders who were found guilty of working adulterated gold or silver. The chief offenders appear to have been the cutlers, who were charged with covering base metal in such a manner that it could not easily be detected. It was therefore provided that all manner of vessels of gold and silver should be of "good and true alloy;" and power was given to the company to "go from shop to shop to assay if the gold was good," and finding that it was not of the right touch, it was to be seized and forfeited for the king. Subsequently, by the statute of 2 Henry VI. (1424), it was provided that none should work gold unless it be as good as the alloy of the "mystery," and that silver wares should be as good or better than the king's coin. It was further provided, that when the goods were finished they should be brought to the Hall to be assayed; and when found of the right touch it should be stamped with the owner's and assayer's marks, as well as with the "Liberdshede crowned." These powers have been confirmed in numerous Acts of Parliament, the most important of which are the following:—12 Geo. II. c. 26 (1739), which provides that no goldsmith, silver smith, or other trader shall work or make any vessel of gold of less than 22-carat fineness (that is, 22 parts of fine gold to 2 parts of alloy), nor any silver vessel or plate of less than eleven ounces and two pennyweights of fine silver, and 18 pennyweights of alloy, in a pound troy, under a penalty of £10. But this does not extend to jewelry, earrings, gold springs, locketts, &c. It also provides for the proper assaying and stamping of the same. In 1784, the Act 24 Geo. III. c. 53, made provision for imposing a duty on the article assayed and stamped,

and from that time the king's or queen's head has appeared as a mark. In 1798, the Act 38 Geo. III. c. 69, gave permission for a lower standard of gold, namely 18-carat gold (that is, 18 parts of fine gold to 6 of alloy); and by the Act 7 and 8 Vict. c. 22 (1844), the penalty for using false stamps, &c., was ameliorated. Lastly, by the Act 17 and 18 Vict. c. 96, three still lower standards of gold were permitted, namely 15-carat gold, 12-carat gold, and 9-carat gold, each of which was to be designated by the number and the decimal. At present, therefore, all gold and silver plate, as well as wedding and mourning rings, must be assayed and stamped before their sale; and other articles may be assayed and stamped in like manner at the option of the maker or dealer. The stamps or marks impressed on gold are the following, namely,—1<sup>st</sup>, The initials of the maker's name; 2<sup>d</sup>, The duty mark (a king's or queen's head); 3<sup>d</sup>, The crown and standard number, indicating the quality of the gold; 4<sup>th</sup>, The assayer's stamp (a leopard's head for Goldsmiths' Hall); and 5<sup>th</sup>, The letter denoting the year of assay. In the case of silver, the stamps are—1<sup>st</sup>, The initial letters of the maker; 2<sup>d</sup>, A lion; 3<sup>d</sup>, The assayer's stamp (in London, a leopard's head); 4<sup>th</sup>, The letter indicating the year of assay; and 5<sup>th</sup>, The duty mark (a king's or queen's head). Silver goods of higher value, that is, with a mixture of 11 ounces and 10 pennyweights of fine silver, instead of 11 ounces and 2 pennyweights, is called new sterling, and is, as formerly, marked with a figure of Britannia, and a lion's head erased. As in olden times, the Goldsmiths' Company have still power to break, cut, or otherwise destroy all gold and silver plate which is below the legal standard. (H. L.)

**ADULTERY** (from the Latin *adulterium*) is the sexual intercourse of a married person with another than the offender's husband or wife. Among the Greeks, and in the earlier period of Roman law, it was not adultery unless a married woman was the offender. The foundation of the later Roman law with regard to adultery was the *lex Julia de adulteriis coercendis* passed by Augustus about B.C. 17. (See *Dig.* 48, 5; *Paul. Rec. Sent.* ii. 26; *Brisson, Ad Leg. Jul. de Adult.*) In Britain it has been reckoned a spiritual offence, that is, cognisable by the spiritual courts only. The common law took no farther notice of it than to allow the party aggrieved an action of damages. In England, however, the action for "criminal conversation," as it was called, is nominally abolished by 20 and 21 Vict. c. 85, § 59; but by the 33d section of the same Act, the husband may claim damages from one who has committed adultery with his wife in a petition for dissolution of the marriage, or for judicial separation, or in a special petition for the purpose in the Divorce Court. In Scotland damages may be recovered against an adulterer in an ordinary action of damages in the civil court, and the latter may be found liable for the expenses of an action of divorce if joined with the guilty spouse as a co-defender.

Adultery is, both in England and Scotland, a ground of divorce. In England, a complete divorce or dissolution of the marriage could, until the creation of the Court of Probate and Divorce by 20 and 21 Vict. c. 85, be obtained only by an Act of Parliament. In Scotland a complete divorce may be effected by proceedings in the Court of Session, as succeeding to the old ecclesiastical jurisdiction of the commissioners. A person divorced for adultery is, by the law of Scotland, prohibited from intermarrying with the paramour. See **DIVORCE**.

**ADVENT**, the period of the approach of the nativity, lasting, in the Greek Church, from St Martin's Day (Nov. 11), and, in other churches, from the Sunday nearest to St

Andrew's Day (Nov. 30) till Christmas. The observance of it dates from the 4th century, and it has been recognised since the 6th century as the commencement of the ecclesiastical year. With the view of directing the thoughts of Christians to the coming of Christ as Saviour, and to his second coming as Judge, special lessons are prescribed for the four Sundays in Advent. At one time Advent was observed almost as strictly as Lent, but the rule is now relaxed, and in the Church of England fasting is confined to the week in which Ember Day (13th Dec.) occurs. The phrase *second advent* is commonly used to denote our Lord's "appearing the second time, without sin, unto salvation," which is so often spoken of in the New Testament. Various opinions have been held as to the time and manner of this event. In the apostolic churches it was commonly regarded as imminent, though this was not the opinion of the apostle Paul, as may be gathered from 2 Thess. ii. 3, 4. The discussion in later times has centred itself chiefly round the question whether the second advent is pre-millennial or post-millennial.

**ADVERTISEMENT** (from the French *avertissement*, a giving notice, or announcement) denotes in a general sense any information publicly communicated through the press or otherwise. It is the profit derived from advertisements that supports the larger number of newspapers. While some of these drag out a sickly existence, others derive a large revenue from this source. The duty upon advertisements (which existed in Britain<sup>1</sup> previous to 1853) was not unjustly branded as a tax upon knowledge. It was certainly very unequal and oppressive, being the same upon the sale of an estate worth £100,000 as on a servant's notice wanting a place, upon an advertisement of a sixpenny

<sup>1</sup> There is no duty on advertisements in the United States, Germany, or France. In France, however, there is a duty of 10 per cent. on the raw paper, and a further duty of 20 per cent. on all newspapers printed.

pamphlet and an expensive book. Previous to 1833 the duty on each advertisement was 3s. 6d. in Great Britain, and 2s. 6d. in Ireland; in that year it was reduced to 1s. 6d. in Great Britain, and 1s. in Ireland. In 1832 (the last year of the high duty) the total number of newspaper advertisements in the U. K. was 921,943: viz., 787,649 in England, 108,914 in Scotland, and 125,380 in Ireland; the amount of duty paid in that year being £172,570. In 1841 the number of advertisements had increased to 1,778,957: viz., 1,386,625 for England, 188,189 for Scotland, and 204,143 for Ireland; and the total duty paid amounted to £128,318. In 1851 the amount of duty rose to £175,094, 10s. 8d.; being for England £142,365, 3s. 6d.; Scotland, £19,940, 11s.; Ireland, £12,788, 16s. 2d. In compliance with the all but unanimous voice of the public, this duty was abolished in 1853; since which time the system of advertising has increased to an unprecedented extent, in consequence of the low rate at which short advertisements are now inserted. To advertise advantageously requires both experience and judgment; without a knowledge of the character and circulation of the public journals, much expenditure may be wasted by advertising in papers that have either a limited or inappropriate circulation. The sale of some commodities (such as quack medicines) depends almost wholly on advertising, of which it has been said that if the vender has the courage to continue advertising to the extent of £20,000, he will make his fortune by a drug thoroughly worthless. Advertising often falls disproportionately on books, as it is necessary that new publications should be freely advertised. On small low-priced books the expense is particularly heavy, an advertisement of a one shilling book costing as much as one selling at twenty shillings. From this, and their generally ephemeral character, it may be said that ninety-nine out of a hundred pamphlets are published at a loss.

Interesting information on the subject of advertisements will be found in an article in the *Edinburgh Review* for 1st Feb. 1843, "On the Advertising System," and in the *Quarterly Review* for June 1855, "On the Rise and Progress of Advertisements, from the establishment of the Newspaper Press of this Country till the Present Time." In the latter article it is stated that the first advertisement occurs in the *Mercurius Politicus* for Jan. 1652, the subject of the advertisement being a heroic poem of congratulation on Cromwell's victories in Ireland. A writer in *Notes and Queries* for July 6, 1872, has found two examples of advertisements previous to that date, which occur in the *Mercurius Elencticus* of Oct. 1648. See also *The Newspaper Press*, by James Grant (2 vols., 1871), and the article NEWSPAPERS.

ADVOCATE (from the Latin *advocatus*), a lawyer authorised to plead the causes of litigants in courts of law. The word is used technically in Scotland in a sense virtually equivalent to the English term *barrister*; and a derivative from the same Latin source is so used in most of the countries of Europe where the civil law is in force. The *advocatus* of the Romans meant, as the word implies, a person whose assistance was called in or invoked. The word is not often used among the earlier jurists, and appears not to have had a strict meaning. It is not always associated with legal proceedings, and might apparently be applied to a supporter or coadjutor in the pursuit of any desired object. When it came to be applied with a more specific limitation to legal services, the position of the *advocatus* was still uncertain. It was different from, and evidently inferior to, that of the *juris-consultus*, who gave his opinion and advice in questions of law, and may be identified with the consulting counsel of the present day. Nor is the merely professional advocate to be confounded with the more distinguished *orator*, or *patronus*, who came forward

in the guise of the disinterested vindicator of justice. This distinction, however, appears to have arisen in later times, when the profession became mercenary. By the *lex Cincia*, passed about two centuries before Christ, and subsequently renewed, the acceptance of remuneration for professional assistance in lawsuits was prohibited. This law, like all others of the kind, was evaded. The skilful debater was propitiated with a present; and though he could not sue for the value of his services, it was ruled that any *honorarium* so given could not be demanded back, even though he died before the anticipated service was performed. The traces of this evasion of a law may be found in the existing practice of rewarding counsel by fees in anticipation of services. In the Justinian collection we find that legal provision had been made for the remuneration of advocates. (*Dig. lib. 50, tit. 12, § 10-13*; *Brissotius, De Sig. Verb.*; *Heineccius ad Pand. lib. iii. tit. 1.*) The *advocatus fisci*, or fiscal advocate, was an officer whose function, like that of a solicitor of taxes at the present day, was connected with the collection of the revenue. (See generally on this subject Forsyth's *Mortensius*, London, 1849.) The term advocate is of frequent use in the chronicles, capitularies, chartularies, and other records of ecclesiastical matters, during the Middle Ages. (See Du Cange, s.v. *Advocati Ecclesiarum*, who affords a profuse supply of references to authorities.) The term was applied in the primitive church to those who defended the Christians against malignants or persecutors. As the church waxed rich and powerful, its temporal supporters assumed a more important position. The advocate, defender, or patron, was of a temporal rank, corresponding to the power of the ecclesiastical body who sought his advocacy. Princes sought the distinction from Rome; and it was as a relic of the practice of propitiating temporal sovereigns by desiring their protection that Henry VIII. received his title of "Defender of the Faith." The office of advocate to any of the great religious houses, possessed of vast wealth, was one of dignity and emolument, generally held by some feudal lord of power and influence. This kind of protection, however, was sometimes oppressive. In the authorities quoted by Du Cange we find that, so early as the 12th century, the advocates were accused of rapine and extortion; and by a capitulary of the popedom of Innocent III. they are prohibited from taking and usurping rewards and privileges beyond use and wont. The office at length assumed a fixed character in its powers and emoluments; and it became the practice for the founders of churches and other ecclesiastical endowments to reserve the office of advocate to themselves and their representatives. The term advocate was subsequently superseded by the word *patron*; but a relic of it still exists in the term *advowson*, and the word *advowee*, which is the form in which the Latin *advocatus* found its way into the technicalities of English law. Until lately, advocate was the proper designation of legal practitioners in the Probate and Admiralty courts, and still is the name given to those who practise in what remains of ecclesiastical courts. In France, corporations or faculties of *avocats* were attached to the parliaments and other tribunals. They formed, before the revolution, a part of the extensive and powerful body commonly called the nobility of the robe. It was not necessary that the *avocat* should be born noble, and his professional rank was little respected by the hereditary aristocracy; but as a middle rank, possessed of great powers and privileges, which it jealously guarded, the profession acquired great influence. In the *Encyclopédie Méthodique*, the *avocat* is called "the tutelary genius of the repose of families, the friend of man, his guide and protector." The *avocats*, as a body, were reorganised under the empire by a decree of 15th December 1810. (See Camus, *Lettres sur la Profession d'Avocat*; A. Young, *The French Bar.*) In



France there is a distinction between *avocats* and *avoués*. The latter, whose number is limited, act as procurators or agents, representing the parties before the tribunals, draft and prepare for them all formal acts and writings, and prepare their lawsuits for the oral debates. The office of the *avocat*, on the other hand, consists in giving advice as to the law, and conducting the causes of his clients by written and oral pleadings. The number of *avocats* is not limited; every licentiate of law being entitled to apply to the corporation of *avocats* attached to each court, and after presentation to the court, taking the oath of office, and passing three years in attendance on some older advocate, to have himself recognised as an advocate. The Faculty of Advocates is the collective term by which the members of the bar are known in Scotland. They professionally attend the supreme courts in Edinburgh; but they are privileged to plead in any cause before the inferior courts, where counsel are not excluded by statute. They may act in cases of appeal before the House of Lords; and in some of the British colonies, where the civil law is in force, it is customary for those who practise as barristers to pass as advocates in Scotland. This body has existed by immemorial custom. Its privileges are constitutional, and are founded on no statute or charter of incorporation. The body formed itself gradually, from time to time, on the model of the French corporations of *avocats*, appointing like them a dean or doyen, who is their principal officer. No curriculum of study, residence, or professional training was, until 1856, required on entering this profession; but the faculty have always had the power, believed to be liable to control by the Court of Session, of rejecting any candidate for admission. The candidate undergoes two private examinations—the one in general scholarship, in lieu of which, however, he may produce evidence of his having graduated as master of arts in a Scottish university, or obtained an equivalent degree in an English or foreign university; and the other, at the interval of a year, in Roman, private international, and Scots law. He must, before the latter examination, produce evidence of attendance at classes of Scots law and conveyancing in a Scottish university, and at classes of civil law, public or international law, constitutional law, and medical jurisprudence in a Scottish or other approved university. He has then to undergo the old academic form of the public impugnement of a thesis on some title of the pandects; but this ceremony, called the public examination, has degenerated into a mere form. A large proportion of the candidate's entrance fees (amounting to £339) is devoted to the magnificent library belonging to the faculty, which literary investigators in Edinburgh find so eminently useful.

**LORD ADVOCATE, or KING'S ADVOCATE**, is the principal law-officer of the crown in Scotland. His business is to act as a public prosecutor, and to plead in all causes that concern the crown. He is at the head of the system of public prosecutions by which criminal justice is administered in Scotland, and thus his functions are of a far more extensive character than those of the English law-officers of the crown. He is aided by a solicitor-general and subordinate assistants called advocates-depute. The office of king's advocate seems to have been established about the beginning of the 16th century. Originally he had no power to prosecute crimes without the concurrence of a private party; but in the year 1597 he was empowered to prosecute crimes at his own instance. He has the privilege of pleading in court with his hat on.

**APPEAL**, in *Scottish Law*, was a mode of appeal from certain inferior courts to the supreme court. It was abolished in 1868, a simple "appeal" being substituted.

**ADVOUSON, or ADVOWZEN** (*advocatus*), in *English Common Law*, the right of presentation to a vacant eccle-

siastical benefice, is so called because the patron defends or advocates the claims of the person whom he presents. Originally all appointments within a diocese lay with the bishop; but when a landowner founded a church on his estate and endowed it, his right to nominate the incumbent was usually recognised. Where the right of presentation remains attached to the manor, it is called an *advowson appendant*, and passes with the estate by inheritance or sale without any special conveyance. But where, as is often the case, the right of presentation has been sold by itself, and so separated from the manor, it is called an *advowson in gross*. Advowsons are further distinguished into *presentative*, *collative*, and *donative*. In a *presentative* advowson, the patron presents a clergyman to the bishop, with the petition that he be instituted into the vacant living. The bishop is bound to induct if he find the clergyman canonically qualified, and a refusal on his part is subject to an appeal to an ecclesiastical court either by patron or by presentee. In a *collative* advowson the bishop is himself the patron, either in his own right or in the right of the proper patron, which has lapsed to him through not being exercised within the statutory period of six months after the vacancy occurred. No petition is necessary in this case, and the bishop is said to *collate* to the benefice. In a *donative* advowson, the sovereign, or any subject by special licence from the sovereign, confers a benefice by a simple letter of gift, without any reference to the bishop, and without presentation and institution. The incumbent of such a living is to a great extent free from the jurisdiction of the bishop, who can only reach him through the action of an ecclesiastical court. When an ecclesiastical body owned an advowson, it very frequently, by *appropriation*, exercised the right in its own favour, the corporation becoming the incumbent of the living, the actual duties of which were discharged by a *vicar* or *perpetual curate*. An advowson, being property, may be sold, or mortgaged, or seized by the creditors on a bankrupt estate, under certain restrictions intended to prevent simony. A sale is absolutely prohibited during the mortal sickness of the incumbent, or during the existence of a vacancy. There are upwards of 13,000 benefices in the Church of England, the advowsons being distributed as shown in the following list, which may be taken as approximately correct:—Under the patronage of the crown there are 1144 livings; bishops, 2324; deans and chapters, 933; the universities, 770; parochial clergy, 931; and private persons, 7000.

**ADYTUM**, the most retired and sacred place of ancient temples, into which none but the officiating priests were allowed to enter. The Most Holy Place of the temple of Solomon was of the nature of the pagan adytum; none but the high priest being admitted into it, and he but once a year.

**Æ, or ÆE**, a diphthong, compounded of *a* and *e*, of frequent occurrence in Latin and in Anglo-Saxon. In the best editions of the classics the form now preferred is *æ*. In English words derived from Latin the diphthong is generally converted into the simple *e*, but it is not unfrequently retained, as in *Æolian*, *medieval*, &c. In some words it represents the Greek *ai*, to which the Latin *æ* corresponds, as in *æsthetics* (*αισθητική*).

**ÆACUS**, in *Mythology*, the son of Jupiter by Ægina. When the isle of Ægina was depopulated by a plague, his father, in compassion to his grief, changed all the ants upon it into men and women, who were called *Myrmidones*, from *μύρμηξ*, an ant. The foundation of the fable is said to be, that when the country had been depopulated by pirates, who forced the few that remained to take shelter in caves, Æacus encouraged them to come out, and by commerce and industry to recover what they had lost. His character for justice and piety was such that, in a time of universal drought, he was nominated by the Delphic oracle

to intercede for Greece and his prayer was answered. The ancients also imagined that Æacus, on account of his impartial justice, was chosen by Pluto one of the three judges of the dead, and that it was his province to judge the Europeans.

**ÆDILE** (*adilis*), in *Roman Antiquity*, a magistrate whose chief business was to superintend buildings of all kinds, but more especially public ones, as temples, aqueducts, bridges, &c. To the ædiles likewise belonged the care of the highways, public places, weights and measures, &c. They also superintended the markets, fixed the prices of provisions, took cognisance of breaches of decency and public order, and took charge of police matters generally. The custody of the *plebiscita*, or decrees of the people, and *senatus consulta*, or decrees of the senate, was likewise committed to them. They had the inspection of theatres and plays, and were obliged to exhibit magnificent games to the people, usually at their own expense, whereby many of them were ruined. They had the power, on certain occasions, of issuing edicts, and by degrees they procured to themselves a considerable jurisdiction. At first there were only two ædiles, viz., the ædiles of the people, *ædiles plebei*, or *minores*. They were first created in the same year as the tribunes, B.C. 494; for the tribunes, finding themselves oppressed with the multiplicity of affairs, demanded of the senate to have officers to whom they might entrust matters of less importance; and accordingly two ædiles were created; and henceforward the ædiles were elected every year at the same assembly as the tribunes. But these plebeian ædiles having refused, on a signal occasion, to continue the great games for four days instead of three, on account of the expense, the patricians made an offer to do it, provided they were admitted to the honours of the ædileship. Accordingly two new ædiles were created, from the order of the patricians, in the year of Rome 388. They were called *ædiles curules*, or *majores*, as having a right to sit on a curule chair when they gave audience; whereas the plebeian ædiles only sat on benches. The curule ædiles alone had the right to issue edicts. Otherwise they shared all the ordinary functions of the plebeian ædiles; they had to procure the celebration of the grand Roman games, and to exhibit comedies, shows of gladiators, &c., to the people; and they were also appointed judges in all cases relating to the selling or exchanging of estates. To assist these first four ædiles, Cæsar (B.C. 45) created a new kind, called *ædiles cereales*, so named from their being deputed chiefly to take care of the supply of corn, which was called *donum Cereis*. These ædiles cereales were also taken out of the order of patricians. In the municipal cities and colonies there were ædiles having much the same authority as at Rome. We also read of an *edilis alimentarius*, expressed in abbreviature by *edil. alim.*, whose business seems to have been to provide diet for those who were maintained at the public charge, though others assign him a different office. In an ancient inscription we also meet with ædile of the camp, *edilis castrorum*.

**ÆGADES**, or **ÆGATES**, a group of islands off the western coast of Sicily, between Trapani and Marsala, consisting of Marettimo, Levanzo, and Favignana. These islands are rendered historically famous by the great naval victory gained there by the Romans over the Carthaginians in B.C. 241, which put an end to the first Punic war.

**ÆGEAN SEA**, a part of the Mediterranean, now more usually called the Archipelago or Grecian Archipelago, bounded on the north by Thrace and Macedonia, on the west by Greece, and on the east by Asia Minor. The origin of the name is uncertain. Various derivations are given by the ancient grammarians—one from the town of *Ægæ*; another from *Ægæa*, queen of the amazons, who perished in this sea; and a third from *Ægeus*, the father

of Theseus, who threw himself headlong into it. See **ARCHIPELAGO**.

**ÆGEUS**, in *Fabulous History*, the son of Pandion, was king of Athens, and the father of Theseus. He was one of the Athenian heroes, but is notable chiefly for the manner of his death. The Athenians having killed Androgeus, the son of Minos, king of Crete, for carrying away the prize for wrestling from them, Minos made war upon them; and being victorious, imposed this severe condition on Ægeus, that he should annually send into Crete seven of the noblest of the Athenian youths and as many maidens, chosen by lot, to be devoured by the Minotaur. On the fourth year of this tribute the choice fell on Theseus, or, as others say, he himself entreated to be sent. The king at his son's departure gave orders that, as the ship sailed with black sails, it should return with the same in case he perished; but if he came back victorious he should change them for white. When Theseus returned from Crete after killing the Minotaur, he forgot to change the sails in token of his victory, according to the agreement; and his father, who sat on a rock watching the return of the vessel, imagining from the black sails that his son was dead, cast himself headlong into the sea, which was supposed in consequence to have obtained the name of the *Ægean Sea*. The Athenians decreed divine honours to Ægeus, and sacrificed to him as a marine deity and an adopted son of Neptune.

**ÆGINA**, in *Fabulous History*, the daughter of Asopus, king of Boeotia, was beloved by Jupiter, who carried her from Epidaurus to a desert island called *Enone* or *Enopia*, which was afterwards called by her name. See **ÆACUS**.

**ÆGINA**, or **EGINA**, or **ENGIA**, an island in the Saronic gulf, 20 miles distant from the Piræus, formerly vying with Athens in naval power, and at the sea-fight of Salamis disputing the palm of victory with the Athenians. It was the native country and kingdom of Æacus, who called it *Ægina*, from his mother's name. (Ovid.) The inhabitants were called *Æginetæ* and *Æginenses*. Ægina is triangular in shape, and is about 8 miles long from N.W. to S.E., and about 6 broad, with an area of about 41 square miles. Strabo states its circumference at 180 stadia, or about 22½ English miles. Its western side consists of stony but fertile plains, which are well cultivated, and produce luxuriant crops of grain, with some cotton, vines, almonds, and figs. The rest of the island is mountainous, and rather barren. The southern end rises in the conical Mount Oros, and the Panhellenian ridge stretches to the north, from which fertile narrow valleys descend on either hand. From the absence of marshes, and its insularity, the climate is mild, and the most salubrious of Greece. The ruins of the ancient Ægina extend along two small ports, still protected by well-built ancient moles, and the shores of an open bay, defended by an ancient breakwater, near the N.W. cape of the island. On the land side the city walls are still distinctly traceable, 10 feet in thickness, strengthened by towers at unequal distances, and pierced by three gates. They abutted on those of the ports, which were thus included within the line of fortifications, as at Athens and elsewhere in ancient Greece. Two elegant Doric columns and substructures are all that remain of the buildings noticed by Pausanias within the precincts of a city that was long the greatest and most opulent maritime power of Greece; but the ruins of seventeen Christian churches, still visible, prove that after the glories of the proud city had passed away—after what it suffered from the jealousy of its rival Athens, and from an earthquake about the beginning of our era—a considerable modern town had occupied its site. Some of these may perhaps only date from the time that Ægina remained under its Venetian masters, as does a tower erected at the entrance



of the largest port. The Venetians resigned possession of the island to the Turks in 1715, under whom it became the prey of Mainote and other pirates, until the emancipation of Greece made it, in 1828-29, the seat of the Greek government. On a hill near the N.E. corner of the island stands the modern little town of Ægina (as it is pronounced by the modern Greeks). It is separated by a ravine from the hill, on which rise in lonely majesty the ruins of a noble temple, supposed to be that of *Jupiter Panhellenius*, though the point has been disputed. The temple occupies the rocky summit of a hill, in the midst of a forest of pines, at the extremity of the Panhellenian ridge. It was a ruin in the days of Cicero, as mentioned in one of his letters, and seems to have been thrown down by an earthquake at an unknown epoch. This temple is conspicuous from a distance, and was visited by Chandler in the last century; but has been chiefly known to us by the successful excavations of our countrymen Cockerell and Foster, assisted by Baron Haller and M. Linckh of Stuttgart, in 1811. These gentlemen united in clearing away the rubbish which the lapse of 2000 years had accumulated on the basement and floor of the cella; and after twenty days' exertion they were rewarded by the discovery not only of many interesting details relating to Grecian architecture, but also of many statues, in wonderfully energetic attitudes, that had once adorned the fallen pediments of this celebrated temple. These consist of the eleven figures of the eastern and five statues of the western pediment, almost entire, besides fragments of the rest, and two statuettes, and other ornaments of the acroteria. These sculptures supply an important link in the history of ancient art, and connect the schools of early Greece with that of Etruscan sculpture. The efforts of Messrs Cockerell and Foster to secure those treasures to their country are well known, as well as their failure through an unlucky mistake of the agent sent out to purchase them for the British Museum. They now form one of the most interesting acquisitions of the magnificent *Glyptothek* of Munich. The temple stands on a stylobate of 94 feet by 45 feet. The original number of columns in the peristyle was thirty-two, of which twelve were ranged on each side, and six in each front, 17 feet 2 inches high, including the wide spreading ovolo of the capital, and a diameter of 3 feet 3 inches at the base. Two other columns, of 3 feet 2 inches between ante, are in the pronaos, and two similar in the opisthodomos or *posticum*. The cella had a door at each end; a double row of smaller columns, 2 feet 4 inches in diameter, were within the cella to support its partial roof; but the greatest portion of the cella was open, as this temple was *hypæthral*. There still remain twenty-one columns of the peristyle, with their architraves; six of the eastern front, and continuously with them are five columns of the north side; the four columns of the pronaos and opisthodomos, and the lower part of the shafts of five within the cella. The tympana had been painted of a bright azure, to give relief to the statues; and the drapery of Minerva, the middle figure of each group, had been painted red and blue. The whole of the ornaments on the cornices and upper mouldings of the pediment had been painted in *encaustic*, not carved. The subject of the groups of statuary appears to be the contest for the body of Patroclus, one of the *Æacids* (or royal progeny of Ægina of old), as described by Homer. (Cockerell *On the Ægina Marbles*; Brand's *Journal*.) This magnificent structure was erected most probably, in the 6th century B.C., but, at all events, undoubtedly belongs to the brilliant period of Æginetan power, when its navy and its commerce were the pride of Greece, and carried its citizens to the remotest shores of the Mediterranean and the Euxine. Silver money is said to have been struck at Ægina long before it was coined

even at Athens. The victory of Salamis was in a great measure owing to the thirty ships of Ægina, and the voice of grateful Greece assigned to her warriors on that eventful day the prize of valour. Yet not long after, the rivalry of Athens began to cloud the prosperity of the haughty islanders, whose fleet she had before defeated; and Ægina at length sunk under the enmity of a relentless commercial rival, that banished her citizens and supplied their place with Attic colonists. After the close of the Peloponnesian war Lysander restored the banished inhabitants, but Ægina never recovered its ancient prosperity.

ÆGINETA, PAULUS, a celebrated surgeon of the island of Ægina, whence he derived his name. According to Le Clerc's calculation, he lived in the 4th century; but Abulfaragius the Arabian places him with more probability in the 7th. His knowledge in surgery was very great, and his works are deservedly famous. The title of the most important of them, as given by Suidas, is *Ἐντομὴς Ἱατρικῆς Βιβλία Ἑννα* (*Synopsis of Medicine in Seven Books*). The sixth book, which treats of surgery, is particularly interesting. The whole work in the original Greek was published at Venice in 1528, and another edition appeared at Basle in 1538. Several Latin translations have been published, and an excellent English version, with commentary, by Dr F. Adams (1844-48). Ægineta is the first writer who takes notice of the cathartic property of rhubarb, and, according to Dr Milward, is the first in all antiquity who deserves the title of accoucheur.

ÆGIS, in *Classical Mythology*, a name given to the shield or buckler of Jupiter. The goat Amalthæa, which had suckled that god, being dead, he is said to have covered his buckler with the skin, or used the skin as a buckler; whence the appellation *ægis*, from *ἄγς*, *ayós*, goat. Jupiter afterwards restored the animal to life, covered it with a new skin, and placed it among the stars. A full description of the ægis of Jupiter is given by Homer, *Il.* v. 738, *ægg*. Apollo is also represented as bearing the *ægis*, and Minerva still more frequently. After Perseus killed Medusa, Minerva nailed her head in the middle of the *ægis*, which thenceforth had the faculty Medusa herself had during her life of converting all who looked on it into stone. Later writers regard the ægis sometimes as a buckler, but often as a cuirass or breastplate. The ægis of Pallas, described by Virgil (*Æn.* lib. viii. v. 435), must have been a cuirass, since the poet says expressly that Medusa's head was on the breast of the goddess. But the ægis of Jupiter, mentioned a little before (v. 354), seems from the description to have been a buckler. The ægis appears to have been really the goat's skin used, as well as the skins of other animals, as a belt to support the shield. When so used it would usually be fastened on the right shoulder, and would partially envelope the chest as it passed obliquely round in front and behind to be attached to the shield under the left arm. Hence, by transference, it would be employed to denote at times the shield which it supported, and at other times a *lorica* or *cuirass*, the purpose of which it in part served. Illustrations of the assumption of the ægis by the Roman emperors may be seen in ancient statues and cameos.

ÆGISTHUS, in *Ancient History*, was the son of Thyestes by his own daughter Pelopea, who to conceal her shame exposed him in the woods. Some say he was taken up by a shepherd and suckled by a goat; whence he was called *Ægisthus*. After he grew up he was recognised by his father, and on the death of the latter he became king of Mycenæ. He did not join the expedition against Troy; and after the departure of the expedition he seduced Clytemnestra, the wife of Agamemnon, and lived with her during the siege of Troy. Afterwards, with her assistance, he slew her husband, and reigned seven years in Mycenæ. He was slain, together with Clytemnestra, by Orestes.

**ÆGOSPOTAMI**, in *Ancient Geography*, a small river in the Thracian Chersonesus, running south-east, and falling into the Hellespont to the north of Sestos,—with a town of the same name, and a station or road for ships, at its mouth. Here the Athenians under Conon, through the fault of his colleague Philocrates, received a signal overthrow from the Lacedæmonians under Lysander (B.C. 405), which involved the taking of Athens, and put an end to the Peloponnesian war. The town does not appear to have existed till after the date of the battle.

**ÆLFRIC**, "the Grammarian," as he has been called, is one of the most voluminous of our old English writers before the Conquest. He flourished at the latter end of the 10th century and the beginning of the 11th. Of his personal history little can be learned, and his birth and death are alike involved in obscurity. We know that he was a pupil of Ethelwold, the friend of Dunstan, at Abingdon. On Ethelwold's advancement, to the see of Winchester, Ælfric accompanied him, and filled the office of chief instructor in the diocese. For the use of his scholars he wrote his Latin and English *Grammar and Glossary* and his *Colloquium*. The last of these is in Latin, with an old English interlinear translation, in which the Latin is rendered word for word. It is interesting for its account of ancient manners, and shows that Ælfric made use of the conversational method in his teaching. The words in his Glossary are not arranged alphabetically, but grouped together into classes. Ælfric afterwards removed to Cerne Abbey, in Dorsetshire, where he composed his *Homilies*, the work on which his fame as an author chiefly depends. They are 80 in number, and were edited by Thorpe in 1844-46 for the Ælfric Society. In composing them, Ælfric drew largely from the fathers. Their style is very simple and pleasing, and obscure words are carefully avoided in order to adapt them to the capacity even of the most ignorant. Subsequent writers made great use of them, and not a few are to be found unabridged in the transition (semi-Saxon) English of the succeeding centuries. They excited great attention about the time of the Reformation, and were appealed to—especially the "Paschal Homily"—to prove that the doctrines of the English Church before the Conquest were at variance with those held by the Church of Rome. Among Ælfric's other works may be mentioned his *Treatise on the Old and New Testaments*, and his *Abridgment of the Pentateuch and the Book of Job*. Of the rest of his life we have little on which we can rely. He attained to the dignity of abbot, but he seems to be a different person from Ælfric, archbishop of Canterbury (995-1006), with whom he is sometimes confounded.

**ÆLIA CAPITOLINA**, a name given to the city built by the Emperor Hadrian, A.D. 134, near the spot where the ancient Jerusalem stood, which he found in ruins when he visited the eastern parts of the Roman empire. A Roman colony was settled here, and a temple was dedicated to Jupiter Capitolinus. Hence the name Capitolina, to which Hadrian prefixed that of his own family.

**ÆLIANUS, CLAUDIUS**, born at Præneste, in Italy. He taught rhetoric at Rome, under the Emperor Alexander Severus, according to Perizonius, but more probably under Hadrian. He was surnamed Μετ' ἄλυσσος, "Honey-tongued," on account of the ease and accuracy with which he spoke and wrote Greek; and he was also named "the Sophist," from his being a teacher of rhetoric. He loved retirement, and devoted himself to study. He greatly admired and studied Plato, Aristotle, Isocrates, Plutarch, Homer, Anacreon, Archilochus, &c.; and, though a Roman, gives preference to the writers of the Greek nation, and employs the Greek language in his works. His curious and entertaining work entitled *Varia Historia* has been frequently republished, as

well as his treatise *De Natura Animalium*. A very useful edition of the latter was published by Schneider, at Leipsic, in 1784, in 8vo; another at Jena, in 1832, by Fr. Jacobs. The collected edition of his works, by Gesner, 1556, fol., contains another work ascribed to him, named *Epistolæ Rusticæ*.

**ÆMILIUS, PAULUS**, the name of a celebrated family of the Æmilia Gens. See **PAULUS**.

**ÆMILIUS, PAULUS**, or **PAOLO EMILIO**, a celebrated historian, born at Verona, who obtained such reputation in Italy that he was invited into France by the cardinal of Bourbon, in the reign of Charles VIII., in order to write the history of the kings of France in Latin, and was presented to a canonry in Notre Dame. He enjoyed the patronage and support of Louis XII. He died at Paris on the 5th of May 1529. His work entitled *De Rebus gestis Francorum* was translated into French by Renard in 1581, and has also been translated into Italian and German.

**ÆNEAS**, in *Fabulous History*, a Trojan prince, the son of Venus and Anchises. He plays a conspicuous part in the *Iliad*, and is represented, along with Hector, as the chief bulwark of the Trojans. Homer always speaks of Æneas and his descendants as destined to reign at Troy after the destruction of Priam and his house. Virgil has chosen him as the hero of his great epic, and the story of the *Æneid*, though not only at variance with other traditions, but inconsistent with itself, can never lose its place as a biography of the mythical founder of the Latin power. Æneas is described in the *Æneid* as escaping from the destruction of Troy, bearing his aged father on his shoulders, carrying in one hand his household gods, while with the other he leads his little son Ascanius or Iulus. His wife Creüsa is separated from them and lost in the tumult. After a perilous voyage he lands in Africa, and is kindly received by Dido, queen of Carthage; who, on his forsaking her to seek a new home, destroys herself. Again escaping the dangers of the sea, he arrives in Italy, where he lands in Latium, and forms an alliance with Latinus, the king of the country, marries his daughter Lavinia, and founds a city which he calls, after her, Lavinium. Turnus, king of the Rutuli, a rejected suitor of Lavinia, makes war on Latinus, and both are slain in battle. The story of the *Æneid* ends with the death of Turnus. According to Livy, on the death of Latinus, Æneas assumes the sovereignty of Latium, and the Trojan and Latin powers are united in one nation. After a reign of three years, Æneas falls in a battle with the Rutuli, assisted by Mezentius, king of Etruria, and is supposed to be carried up into heaven, because his body cannot be found. After his death or disappearance he receives divine honours.

**ÆNEAS SYLVIUS, POPE**. See **PIUS II.**

**ÆOLÆ INSULÆ**, the modern **LIPARI ISLANDS**, a group of islands between Italy and Sicily. They are so called from Æolus, the god of the winds, who was supposed to rule over them; but they are also frequently termed *Insulæ Vulcaniæ*, or *Hephestiæ*, from their volcanic eruptions, and *Insulæ Liparæorum*, from *Lipara* (modern Lipari), the chief of the group. According to Pliny, the other islands are *Hiera*, now *Vulcano*; *Strongyle*, now *Stromboli*; *Didyme*, now *Salina*; *Phaniscusa*, now *Felicudi*; *Ævonymus*, probably *Panaria*; and *Ericusa*, now *Alicudi*. Besides these there are several small islets. Homer mentions only one Æolian island (*Od. x. 1*).

**ÆOLIAN HARP**, named from Æolus, god of the wind, a musical instrument consisting of cat-gut strings stretched over a wooden sound-box. When exposed to a current of air, the strings produce a variety of pleasing harmonic sounds in strange succession and combination.

**ÆOLIS**, or **ÆOLIA**, in *Ancient Geography*, a country of Asia Minor, settled by colonies of Æolian Greeks. The



name in its limited sense was applied to the coast extending from the river Hermus to the promontory of Lectum, on the north side of the entrance to the Gulf of Adramyttium, and lying between Ionia to the S. and Troas to the N. In its wider acceptance it comprehended Troas and the coasts of the Hellespont to the Propontis, where there were likewise several Æolian colonies.

**ÆOLUS**, in *Heathen Mythology*, the god and father of the winds, was variously represented as the son of Hippotes, or of Neptune by a daughter of Hippotes, or of Jupiter. In the *Odyssey* he is mentioned as the king of the Æolian isle to whom Jupiter had given the superintendence and distribution of the winds. Later poets make him the god and father of the winds, who dwell in one of the Æolian islands—according to some in Stromboli, according to others in Lipari, while others place his residence at Rhegium in Italy. He is represented as having authority over the winds, which he confined in a vast cavern. Strabo and some other writers consider him to have had a real existence; and derive the fable of his power over the winds from his skill in meteorology and the management of ships.

Hic vasto rex Æolus antro,  
Luctantes ventos tempestatesque sonoras  
Imperio premit, ac vinctis et carcere frenat.  
Illi indignantes magno cum murmure montis  
Circum claustra fremunt; celsa sedet Æolus arce  
Sceptra tenens, mollique animos, et temperat iras:  
Ni faciat, maria ac terras œcumenque profundum  
Quippe ferant rapidi cœcis, verrantque per auras.

*Æneid*, lib. i. 52.

Here Æolus, in cavern vast,  
With bolt and barrier fetters fast  
Rebellious storm and howling blast.  
They with the rock's reverberant roar  
Chafed blustering round their prison door:  
He, throned on high, the sceptre sways,  
Controls their moods, their wrath allays.  
Break but that sceptre, sea and land,  
And heaven's etherial deep,  
Before them they would whirl like sand,  
And through the void air sweep.

*Conington's Translation.*

Through Hippotes, Æolus is usually represented as descended from Æolus, one of the sons of Hellen, and the mythological ancestor of the Æolian tribes.

**ÆON** (*αἰών*), a space of time, was often used in Greek to denote indefinite or infinite duration; and hence, by metonymy, for a being that exists for ever. In the latter sense it was chiefly used by the Gnostic sects to denote those eternal beings or manifestations which emanated from the one incomprehensible and ineffable God. See **GNOSTICISM**.

**ÆPINUS**, **FRANZ MARIA ULRICH THEODOR**, a distinguished German natural philosopher, was born at Rostock in Saxony in 1724, and died at Dorpat in August 1802. He was descended from John Æpinus (b. 1499—d. 1553), the first to adopt the Greek form (*αἰρεσις*) of the family name, a leading theologian and controversialist at the time of the Reformation. After studying medicine for a time, Francis Æpinus devoted himself to the physical and mathematical sciences, in which he soon gained such distinction that he was admitted a member of the Berlin Academy of Sciences. In 1757 he settled in St Petersburg as member of the Imperial Academy of Sciences and professor of physics, labouring there and pursuing his favourite studies with great success till his death. He enjoyed the special favour of the Empress Catharine II., who appointed him tutor to her son Paul, and endeavoured, without success, to establish normal schools throughout the empire under his direction. Æpinus is best known by his researches, theoretical and experimental, in electricity and magnetism. His principal work, *Tentamen Theoriae Elec-*

*tricitatis et Magnetismi*, published at St Petersburg in 1759, may be regarded as the first systematic and successful attempt to apply mathematical reasoning to these subjects. Adopting Franklin's theory of positive and negative electricities, or electric forces, he investigated the relations of these fully, and especially the conditions of their equilibrium; and many of the conclusions he arrived at do not depend for their value and importance on the theory of Franklin. Æpinus himself extended the theory, holding that the particles of the electric fluid repel each other, attract the particles of all bodies, and are attracted by them, with a force inversely proportional to the distance; that the fluid resides in the pores of the surfaces of bodies, moving readily through some, called conductors or non-electrics, and with difficulty through others; and that electric phenomena are produced either by the approach of bodies unequally charged, or by the unequal distribution of the fluid in the same body. He propounded a kindred theory of magnetism, a magnetic fluid being supposed to exist corresponding to the electric fluid, but acting on, and acted on by, the particles of iron only. It is to be added that Æpinus was the first to perceive and define, with any measure of clearness, the affinity between electricity and magnetism. There is a remarkable similarity between portions of the work above named and a paper by Cavendish—the result of independent investigations—given in the *Philosophical Transactions* for 1771. In 1787 the Abbé Haüy published an exposition of Æpinus's theories. Æpinus did not confine himself to one or two departments of natural science. He published a treatise, in 1762, *On the Distribution of Heat at the Surface of the Earth*; and he was also the author of valuable memoirs on different subjects in astronomy, mechanics, optics, meteorology, and pure mathematics, contained in the journals of the learned societies of St Petersburg and Berlin. His discussion of the effects of parallax in the transit of a planet over the sun's disc excited great interest, having appeared (in 1764) between the dates of the two transits of Venus that took place during last century.

**ÆQUI**, an ancient and warlike people of Italy, inhabiting the upper valley of the Anio, who, in confederacy with the Volsci, carried on a long series of hostilities with the early Romans, but were finally subdued in the year 302 B.C.

**ÆRARIANS**, a class in ancient Rome, composed of citizens who had suffered the severest kind of degradation the censors could inflict, but concerning whose exact position we have no precise information. Though heavily taxed, they did not enjoy the rights of citizenship beyond their liberty and the general protection of the state. They could not vote in assemblies or serve in the army, and were deprived of and excluded from all posts of honour and profit. Romans of the higher classes, as well as the plebeians, were liable to become Ærarians. The name may be derived from *æres*, money, since they were mere tax-payers; or, which is more probable, it may refer to the list of them which the censors gave in to the *ærarium* or public treasury.

**ÆRARIIUM**, the public treasury at ancient Rome. It contained the moneys and accounts of the state, and also the standards of the legions, the public laws engraven on brass, the decrees of the senate, and other papers and registers of importance. The place where these public treasures were deposited, from the time of the establishment of the republic, was the temple of Saturn, on the eastern slope of the Capitoline hill. In addition to the common treasury, supported by the general taxes and charged with the ordinary expenditure, there was a reserve treasury, also in the temple of Saturn, the *ærarium sanctum* (or *sanctius*), maintained chiefly by a tax of 5 per cent. on the value of all manumitted slaves, which was not to

be had recourse to, or even entered, except in the extreme necessity of the state. Under the emperors the senate continued to have at least the nominal management of the *erarium*, while the emperor had a separate exchequer, called the *fiscus*. But after a time, as the power of the emperors increased and their jurisdiction extended till the senate existed but in form and name, this distinction virtually ceased. Besides creating the *fiscus*, Augustus also established a military treasury (*erarium militare*), containing all moneys raised for and appropriated to the maintenance of the army. The later emperors had a separate *erarium privatum*, containing the monies allotted for their own use, distinct from the *fiscus*, which they administered in the interests of the empire.

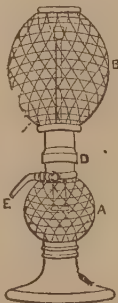
**AERATED WATERS.** Waters impregnated with an unusually large proportion of carbonic acid, or other gaseous substances, occur abundantly in springs throughout the world; and, in addition to their gaseous constituents, generally hold in solution a large percentage of different salts. The manufacture of aerated waters arose out of the attempt to imitate these by artificial means, but till about the beginning of the present century such efforts did not meet with great success. The earliest method of producing acidulated water was that which still obtains in the preparation of effervescing draughts, such as are made from "Seidlitz" powders. These powders consist of separate portions of sodium bicarbonate and tartaric acid, which, on being dissolved together in water, form sodium tartrate and liberate carbonic acid, which bubbles up through the water. In recent years "granular" effervescent preparations have been introduced, in which the acid and salt are mixed in a dry state, and produce their reaction on being dissolved. The popular preparation termed effervescent citrate of magnesia, and several others under a variety of names, consist essentially of sodium bicarbonate and tartaric acid, to which a little citric acid is sometimes added. A limit, however, is set to the use of waters so aerated on account of the purgative action of the alkaline earths they necessarily contain.

In the manufacture of common aerated waters the carbonic acid is prepared apart from the pure water in which it is to be dissolved. There are essentially only two methods on which the manufacture is conducted, although there is an endless variety in the apparatus used. In the first process, which may be distinguished as the method of chemical pressure, the carbonic acid gas saturates the water by its own pressure, passing directly from the chamber in which it is produced and purified, into the cylinder or cylinders containing the water to be aerated. The small apparatus frequently used in private houses and hospitals may be taken as an illustration of this method. The most common form consists of two strong glass globes A and B, protected by netting in case of breakage. Into the globe A are placed the materials for generating carbonic acid, usually in this case tartaric acid and sodium bicarbonate. When charged with these materials, a metal tube C, accurately fitted to the aperture in the globe, is inserted. The globe B is inverted and filled with water, and in this position the globe A is screwed tightly up by the joint D, the metal tube reaching to near the top of globe B. On placing the apparatus upright, a proportion of water escapes through the metal tube into globe A, acts on the charge it contains, and evolves carbonic acid, which passes up the tube and saturates the water in B. As the pressure of the gas

augments, the quantity absorbed increases, and when fully saturated the aerated water may be drawn off by the cock E. In manufacturing on a large scale, a combination of globes or cylinders is used for producing continuous action, and less expensive sources of carbonic acid than sodium bicarbonate and tartaric acid are employed. The second or mechanical pressure process is that generally followed in the manufacture in this country. In this process the gas is prepared in a lead chamber by the action of sulphuric acid on chalk, and is washed by passing through water into the gas-holder in which it is collected. By the action of a force-pump, water, filtered when necessary, and carbonic acid, are pressed, in due proportions, into a very strong copper cylinder, tinned internally, termed a receiver or saturator, in which an agitator is kept revolving. A pressure gauge is attached to the receiver, and when the index indicates from 120 to 140 lb pressure per square inch, what is termed aerated water, and very frequently does duty for soda-water, is ready for drawing off at the bottling apparatus. Real soda-water is best prepared by adding to the water before aeration a proportion of sodium bicarbonate equal to about 30 or 36 grains per pint of water. Potash-water, Seltzer, lithia, Carrara, bromide of potassium, and a host of other waters, are similarly prepared, the various salts being used in different proportions, according to the taste and experience of manufacturers. Lemonade, and other aerated drinks flavoured with fruit syrups, have the proportion of syrup placed in the bottle to which simple aerated water taken from a receiver, indicating a pressure of 80 to 100 lb per square inch, is added. From a syrup composed of 14 lb of sugar, 2½ oz. of tartaric acid, 3½ oz. of citric acid, and 4½ drachms of essence of lemon, dissolved in 2½ gallons of water, 30 dozen bottles of an excellent quality of lemonade can be prepared. On account of the rapidity with which the gas escapes on the removal of pressure, special arrangements are required for the bottling and corking processes, and the frequent explosion of bottles necessitates guards to protect the bottler. A dexterous bottler will fill and cork 5000 bottles in ten hours. The consumption of aerated waters, especially in hot climates, is very great.

**AERØE, or ARØE**, an island of Denmark, in the Little Belt, lying 7½ miles S. of Funen, between Alsen and Langeland. It is of an irregular triangular shape, about 15 miles long and 8 broad at the widest points, with a hilly surface, but a fertile and well-cultivated soil. Population, 10,200; chief town, Aereskjøbing, on the east coast.

**AEROLITE** (αἰρ, air, and λίθος, a stone), a stony or metallic body, which, falling through the atmosphere, reaches the earth's surface. These meteoric stones generally contain a considerable proportion of iron; indeed, the iron in some of these substances exceeds the siliceous matter, and some have then given them the name of meteoric irons. A remarkable aerolite that fell at Agosopotami, in 467 B.C., was, according to Pliny, to be seen in his day, and was then as large as a waggon. In 1492 one fell at Ensishheim, in Alsace, that weighed 270 lb.; and, not to mention others, one of 12 lb weight is reported to have fallen in California in August 1873, which penetrated the earth to the depth of 8 feet, and when dug up was so hot that it could not be handled. Aerolites often reach the earth in groups or showers, as at L'Aigle, in Normandy, in 1803; at New Concord, Ohio, in May 1860; and at Dhurmsala, in the Punjab, in July the same year. The area on which a shower of aerolites falls is usually elliptical, the largest stones being near one end of the ellipse, the major axis of which extends in some cases to a length of eighteen or twenty miles. See METEOR.







MONTGOLFIER'S BALLOON



BLANCHARD'S BALLOON.



## References to Blanchard's Balloon

- A The Balloon made of Taffeta, 26 Feet in diameter covered with it.  
 B The Car suspended by longitudinal Cords from the Hoop C.  
 D D D D The Wings moved by Rack-work E.  
 F A Parachute or Umbrella to break the force of descent if the Balloon should burst.  
 G A Tube communicating with the outside of the Balloon.

GARNIERIN'S PARACHUTE.

*in ascending*

GARNIERIN'S PARACHUTE

*in descending*

LUNARDI'S BALLOON



CHARLES' &amp; ROBERT'S BALLOON



Scale of Feet  
 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200



# AERONAUTICS

Gradual  
discovery  
of naviga-  
tion.

IN every stage of society men have sought, by the combination of superior skill and ingenuity, to attain those distinct and obvious advantages which nature has conferred on the different tribes of animals, by endowing them with a peculiar structure and a peculiar force of organs. The rudest savage learns from his very infancy to imitate the swimming of a fish, and plays on the surface of the water with agility and perseverance. But an art so confined in its exercise, and requiring such a degree of bodily exertion, could not be considered of much avail. It must have been soon perceived (even if the discoveries of the arts of natation and navigation were not absolutely simultaneous), that the fatigue of impulsion through the water could be greatly diminished by the support and floating of some light substance. The trunk of a tree would bear its rude proprietor along the stream; or, hollowed out into a canoe and furnished with paddles, it might enable him even to traverse a river. From this simple fabric the step was not great to the construction of a boat or barge, impelled by the force of oars. But it was a great advance to fix masts and apply sails to the vessel, and thus substitute the power of wind for that of human labour. The adventurous sailor, instead of plying on the narrow seas or creeping timidly along the shore, could now launch with confidence into the wide ocean. Navigation, in its most cultivated form, may be fairly regarded as one of the sublimest triumphs of human genius, industry, courage, and perseverance.

Analogy  
between  
navigation  
and flying  
only very  
vague

Having by his skill achieved the conquest of the waters that encompass the habitable globe, it was natural for man to desire likewise the mastery of the air in which we breathe. In all ages, therefore, great ingenuity has been expended in efforts at flying, all of which have as yet resulted in failure. But the analogy between sailing on the water and sailing in the air is not so close as many enthusiasts have supposed it to be. There is a general resemblance, inasmuch as in both cases the propulsion must be made by means of a fluid. But in the one case the fluid is inelastic, in the other elastic; and the physicist or mathematician knows how vastly different are the properties of liquids, even in fundamental points, from those of aeriform or gaseous bodies. Again, in the one case the vessel floats on the surface of the water, in the other it must float totally immersed in the aerial fluid. A ship, while sailing, is acted on by two fluids—the water supports it and the air propels it; but a ship sailing in the air would be only under the action of the one fluid that surrounds it on all sides. These few considerations—and many more might be added—indicate the essential distinctions between the two cases; and a very little thought shows that it is not so remarkable as it at first sight appears, that the invention of the art of sailing on the water should be lost in prehistoric antiquity, while that of sailing in the air is not a century old; and that while navigation is one of the most perfect of the arts, the power of directing a body floating in the air still remains unattained. Many have argued, that because navigation is an accomplished fact, therefore the navigation of the air must be possible; and without denying the truth of the conclusion, it is worth while at the outset of this article to point out the fallacy of the reasoning. It is true that there is no reason to despair of the attainment of aerial navigation, as the history of invention and science records many victories as great and at one time apparently as far off; still, it is as well to notice how little assistance the old discovery affords towards the solution of the new: it may, indeed, even be that progress has been retarded by the false analogy, for we may feel pretty certain

that if ever the air is navigated, it will be by ships presenting little resemblance to those that traverse the ocean.

The subject of aerostation is scarcely ever alluded to by the classical writers, and the fable of Dædalus and Icarus, and the dove of Archytas, form almost all we have to record in relation to flying previous to the dark ages. Dædalus, an Athenian, killed his nephew Talus through jealousy of his talents, and fled with his son Icarus to Crete, where he built the celebrated labyrinth for Minos, the king. But having offended Minos, so that he was imprisoned by him, he made wings of feathers, cemented with wax, for himself and his son, so that they might escape by flight. He gave his son directions to fly neither too low nor too high, but to follow him. Icarus, however, becoming excited, forgot his father's advice, and rose so high that the heat of the sun melted the wax of his wings, and he fell into the sea near Samos, the island of Icaria and the Icarian sea being named after him. Dædalus accomplished his flight in safety. (Ovid, *Met. lib. viii. Fab. iii.*) The explanation of the myth may be, as has been supposed, that Dædalus used sails, which, till then, according to Pausanias and Palæphatus, were unknown, and so was enabled to escape from Minos' galleys, which were only provided with oars; and that Icarus was drowned near the island Icaria. But the whole story of Dædalus is so fanciful a romance, that it is scarcely worth while even to speculate upon what the infinitesimal fragment of truth that lay at the bottom of it may have been.

Archytas of Tarentum was a well-known geometer and astronomer, and he is apostrophised by Horace (*Ode 28, lib. i.*) The account of his flying pigeon or dove we owe to Aulus Gellius (*Noctes Atticæ*), who says "that it was the model of a dove or a pigeon formed in wood, and so contrived as by a certain mechanical art and power to fly: so nicely was it balanced by weights, and put in motion by hidden and enclosed air." Gellius gives as his authorities "many men of eminence among the Greeks," whom he does not mention by name, and Favorinus the philosopher.

Archytas thus has been regarded as holding to aeronautics much about the same position as Archimedes does to the mechanical sciences; but while the claim of the latter rests on real discoveries and great contributions to knowledge, the former owes his position merely to an unsupported and untrustworthy tradition. When the fire-balloon was invented, it was only natural that many should see in the "hidden and enclosed air" of Archytas' dove a previous discovery of the hot-air balloon. It is quite possible that Archytas may have rarefied the air in his dove by heat, and so made it ascend; but in this case it certainly could not have been made of wood. But if the dove ever was made to appear to fly, it is much the more probable that this effect was produced, as in the scenes at theatres, by means of fine strings or wires invisible to the spectators.

The ancients seem to have been convinced of the impossibility of men being able to fly, and they appear to have made no attempts in this direction at all. The power of flying was attributed only to the most powerful of the divinities; and it was regarded as only secondary to Jupiter's prerogative of flashing the lightning and hurling the thunderbolt.

The history of aerostatics in the Middle Ages, like that of Aerostatics every other subject relating even remotely to science or in the dark knowledge of any kind, is little better than a record of the falsehoods or chimeras circulated by impostors or enthusiasts. Truth was completely obscured by ignorance and fanaticism, and every person of superior talents and acquire-

ments was believed to deal in magic, and to perform his feats of skill chiefly through the secret aid granted him by the prince of darkness; and in a later and comparatively recent period, those wretched creatures whom the unfeeling credulity of our ancestors, particularly during the prevalence of religious fanaticism, stigmatised and murdered under the denomination of witches, were supposed to work all their enchantments, to change their shapes at will, and to transport themselves through the air with the swiftness of thought, by a power derived from their infernal master, to whom was thus assigned the privilege of conferring the gift of aerial navigation upon his servants.

During the darkness of the Middle Ages every one at all distinguished for his knowledge in physics was generally reputed to have obtained the power of flying in the air. Friar Bacon did not scruple to claim the invention; and the credulity and indulgent admiration of some authors have lent to these pretensions more credit than they really deserved. Any one who takes the trouble to examine the passages of Bacon's obscure and ponderous works will find that the propositions advanced by him are seldom founded on reality, but ought rather to be considered as the illusions of a lively fancy. Albertus Magnus, who flourished in the first half of the 13th century, was reputed to have discovered the art; and to give an idea of the state of the physical sciences at that time, it is worth while to quote the following recipes from his *De Mirabilibus Naturæ*:—"Take one pound of sulphur, two pounds of willow-carbon, six pounds of rock-salt ground very fine in a marble mortar; place, when you please, in a covering made of flying papyrus to produce thunder. The covering, in order to ascend and float away, should be long, graceful, well filled with this fine powder; but to produce thunder, the covering should be short, thick, and half full." (Quoted in *Astra Castra*, p. 25.) Regiomontanus, the first real mathematician after the partial revival of learning, is said, like Archytas, to have formed an artificial dove, which flew before the Emperor Charles V. at his public entry into Nuremberg; but the date of Regiomontanus' death shows this to have been impossible.

Attempts  
at flying;

Attempts at flying have, as a rule, been made by a somewhat low class of projectors, who have generally united some little share of ingenuity to a smattering of mechanics. At the beginning of the 16th century an Italian alchemist visited Scotland, and was collated by James IV. to the abbacy of Tunland, in Galloway. Having constructed a set of wings, composed of various plumage, he undertook from the walls of Stirling Castle to fly through the air to France. This feat he actually attempted, but he soon came to the ground, and broke his thigh-bone by the violence of the fall—an accident he explained by asserting that the feathers of some fowls were employed in his wings, and that these had an affinity for the dunghill, whereas, if composed solely of eagles' feathers, they would have been attracted to the air. This anecdote has furnished to Dunbar, the Scottish poet, the subject of one of his rude satires. In 1617, Fleyder, rector of the grammar school at Tübingen, delivered a lecture on flying, which he published eleven years afterwards. A poor monk, however, ambitious to reduce the theory to practice, provided himself with wings; but his machinery broke down, and falling to the ground, he broke his legs and perished. Bishop Wilkins (*Mathematical Magick*, 1648) says it was related that "a certain English monk called Elmerus, about the Confessor's time," flew by means of wings from a tower a distance of more than a furlong; that another person flew from St Mark's steeple at Venice; and another, at Nuremberg. He also quotes Busbequius to the effect that a Turk also attempted something of the kind at Constantinople. It would probably not be very difficult to make a long list of

such narrations, in some of which the experimenter is related to have been successful, and in others to have failed; but the evidence is in no case very good, and we may feel certain that all the traditions of attempts with a successful issue are false.

In Borelli's posthumous work, *De Motu Animalium*, published at Rome in 1680-81, he calculated the enormous strength of the pectoral muscles in birds; and his proposition (vol. i. pp. 322-326) is entitled "Est impossibile, ut homines propriis viribus artificiosè volare possint," in which he clearly points out the impossibility of man being able by his muscular strength to give motion to wings of sufficient extent to keep him suspended in the air. But Borelli did not, of course, as has sometimes been stated, demonstrate the impossibility of man's flying otherwise than merely by means of his own muscular power.

A very slight consideration of the matter shows that, although the muscles of man may not be of sufficient strength to enable him to use wings, this objection does not apply against the possibility of making a flying chariot in which the motive power should be produced mechanically as in a watch, or a boat to float in the atmosphere. Both these projects have therefore always engaged the attention of abler men than has the art of flying, and it was only the ignorance of the nature and force of the atmosphere, as well as of the properties of all aeriform bodies, that caused so long a time to elapse before the invention of the balloon.

Albert of Saxony, a monk of the order of St Augustine, and a commentator on the physical works of Aristotle, seems first to have comprehended (though in a very vague and erroneous manner) the principles on which a body might be made to float in the atmosphere. Adopting, of course, Aristotelian views with regard to the nature of the elements, he considered that, as fire is more attenuated, and floats above our atmosphere, therefore a small portion of this ethereal substance, enclosed in a light hollow globe, would raise it to a certain height and keep it suspended in the air; and that, if more air were introduced, the globe would sink like a ship when water enters by a leak. Long afterwards Francis Mendoza, a Portuguese Jesuit, who died in 1626, at the age of forty-six, embraced this theory, and he held that the combustible nature of fire was no real obstacle, as its extreme levity and the extension of the air would prevent it from supporting inflammation. Casper Schott, also a Jesuit, adopted the same speculation, only that he replaced the fire by the thin ethereal substance which he believed floated above our atmosphere; but, of course, the difficulty of procuring any of this ether was a sufficient obstacle.

Francis  
Mendoza,

Casper  
Schott.

Similar notions have been revived at different times. They were likewise often blended with the alchemical tenets so generally received in the course of the 15th, 16th, and part of the 17th centuries. Thus Schott quotes Lauretus Laurus to the effect that if swans' eggs or leather balls be filled with nitre, sulphur, or quicksilver, and be exposed to the sun, they will ascend. It was also believed that dew was of celestial origin, being shed by the stars, and that it was drawn up again in the course of the day to heaven by the heat of the sun. Thus Laurus states that hens' eggs filled with dew and exposed to the solar heat, will rise. He was so grossly ignorant, however, of the principles of motion, that it is not worth while even to allude to his other assertions.

Alchemica  
notions.  
Lauretus  
Laurus.

Cyrano de Bergerac (born 1620) wrote a philosophical romance entitled *Histoire Comique des États et Empire de la Lune*, and *Les États et Empire du Soleil* (from which Swift is supposed to have derived the idea of writing portions of *Gulliver's Travels*). To equip himself for performing the journey to the moon, the French traveller fastens round his body a multitude of very thin flasks

Romance  
of Cyrano  
de Ber  
gerac



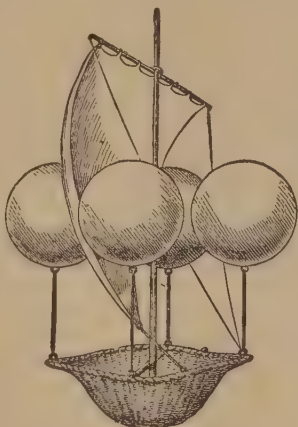
filled with the morning's dew; the heat of the sun, by its attractive power on the dew, raised him up to the middle region of the atmosphere, whence, some of the flasks being broken, the adventurer sank again to the ground. Other aeronautical ideas occur in the romance.

Cardan.  
Fabry.

Cardan proposed that ascensional power might be applied as in a rocket; and one Honoratus Fabry has described a huge apparatus, consisting of long tin pipes, worked by air compressed by the action of fire.

The most noted scheme for navigating the air promulgated previously to the successful experiments of the Montgolfiers, is due to a Jesuit, Francis Lana, and was proposed by him in a work entitled *Pròdromo dell'Arte Maestra*, Brescia, 1670. His idea, though useless and unpractical in so far that it could never be carried out, is yet deserving of notice, as the principles involved are sound; and this can be said of no earlier attempt. His project was to procure four copper balls

Francis  
Lana.



Lana's Aeronautical Machine.

of very large dimensions, yet so extremely thin that after the air was exhausted from them they would be lighter than the air displaced, and so would rise; and to those four balls he proposed to attach a boat, with sails, &c., and which would carry up a man. He submitted the whole matter to calculation, and proposed that the globes should be about 25 feet in diameter and  $\frac{1}{10}$  of an inch in thickness; this would give from all four balls a total ascensional force of about 1200 lb, which would be quite enough to raise the boat, sails, passengers, &c. But the obvious objection to the whole scheme is, that it would be quite impossible to construct a globe of so large a size and of such small thickness which would even support its own weight without falling to pieces if placed on the ground, much less bear the external atmospheric pressure when the internal air was removed. Lana himself noticed the latter objection, but he thought that the spherical form of the copper shell would, notwithstanding its extreme thinness, enable it, after the exhaustion was effected, to sustain the enormous pressure, which, acting equally on every point of the surface, would tend to consolidate rather than to break the metal. Of course this assumed the ball to be absolutely spherical, a state of affairs as impossible as indifferent equilibrium actually is. He proposed to exhaust the air from the globes by attaching each to a tube 36 feet long, fitted with a stopcock, and so produce a Torricellian vacuum. He was thus apparently ignorant of the invention of the air-pump by Otto Guericke about 1650; and though his project is noteworthy as the hydrostatics of it is correct, still Lana displays his ignorance of philosophical facts known in his day, quite as much as his originality; and his proposition has, since Montgolfier's discovery, received a greater share of notice than it deserves.

So late as 1756, and not long before the invention of balloons, a very fanciful scheme was proposed by Joseph Galien, a Dominican friar, and professor of philosophy and

Joseph  
Galien.

theology in the papal university of Avignon. This visionary proposed to collect the diffuse air of the upper regions, and to enclose it in a huge vessel extending more than a mile every way, and intended to carry fifty-four times as much weight as did Noah's ark. It is unnecessary to notice at greater length this absurd chimera, which is merely mentioned here at all because it is sometimes referred to, though only on account of the magnitude of the fantastic scheme.

It is proper here to remark, that nearly all the early projectors imagined that the atmosphere was of no great height, and that it covered the earth like a shallow ocean, having a well-defined boundary; and the aerial vessels which they proposed were intended to float on the surface of this ocean, exactly as ships do on the sea, with their upper portions in the ether or diffuse air, or whatever the fluid might be, that lay above. And these ideas were, of course, not dispelled till after the invention of the barometer and the discovery of the law of the decrease of atmospheric pressure with elevation.

False ideas  
with regard  
to the at-  
mosphere.

Some writers have stated that Francis Bacon first published the true principles of aeronautics. This assertion we cannot help noticing, because it has really no foundation except in the propensity, fostered by indolence, which would gladly refer all the discoveries ever made to a few great names. They mistake, indeed, the character of Bacon who seek to represent him as an inventor. His claim to immortality rests chiefly on the profound and comprehensive views which he took of the bearings of the different parts of human knowledge; for it would be difficult to point out a single fact or observation with which he enriched the store of physical science. On the contrary, being very deficient in mathematical learning, he disregarded or rejected some of the noblest discoveries made in his own time.

Confused  
ideas of  
Bacon on  
aeronautics

We can find only two passages in Bacon's works which can be considered as referring to aeronautics, and they both occur in that collection of loose facts and 'nonconclusive reasonings' which he has entitled *Natural History*. The first is styled *Experiment Solitary, touching Flying in the Air*, and runs thus—"Certainly many birds of good wing (as kites and the like) would bear up a good weight as they fly; and spreading feathers thin and close, and in great breadth, will likewise bear up a great weight, being even laid, without tilting up on the sides. The farther extension of this experiment might be thought upon." The second passage is more diffuse, but less intelligible; it is styled *Experiment Solitary, touching the Flying of unequal Bodies in the Air*.—"Let there be a body of unequal weight (as of wool and lead or bone and lead); if you throw it from you with the light end forward, it will turn, and the weightier end will recover to be forwards, unless the body be over long. The cause is, for that the more dense body hath a more violent pressure of the parts from the first impulsion, which is the cause (though heretofore not found out, as hath been often said) of all violent motions; and when the hinder part moveth swifter (for that it less endureth pressure of parts) than the forward part can make way for it, it must needs be that the body turn over; for (turned) it can more easily draw forward the lighter part." The fact here alluded to is the resistance that bodies experience in moving through the air, which, depending on the quantity of surface merely, must exert a proportionally greater effect on rare substances. The passage itself, however, after making every allowance for the period in which it was written, must be deemed confused, obscure, and unphilosophical.

We now come to the discovery of the balloon, which was due to Stephen and Joseph Montgolfier, sons of Peter Montgolfier, a large and celebrated papermaker at Annonay,

Discovery  
of the  
balloon.

The brothers Montgolfier.

a town about 40 miles from Lyons. The brothers had observed the suspension of clouds in the atmosphere, and it occurred to them that if they could enclose any vapour of the nature of a cloud in a large and very light bag, it might rise and carry the bag with it into the air. They accordingly made experiments, inflating bags with smoke from a fire placed underneath, and found either that the smoke or some vapour emitted from the fire did ascend and carry the bag with it. Being thus assured of the correctness of their views, they determined to have a public ascent of a balloon on a large scale. They accordingly invited the States of Vivarais, then assembled at Annonay, to witness their aerostatic experiment; and on June 5, 1783, in the presence of a considerable concourse of spectators, a linen globe of 105 feet in circumference was inflated over a fire fed with small bundles of chopped straw, and when released rapidly rose to a great height, and descended, at the expiration of ten minutes, at the distance of about  $1\frac{1}{2}$  mile. This was the discovery of the balloon. The brothers Montgolfier imagined that the bag rose because of the levity of the smoke or other vapour given forth by the burning straw; and it was not till some time later that it was recognised that the ascending power was due merely to the lightness of heated air compared to an equal volume of air at a lower temperature. Air, like all other fluids, expands by heat, and thereby becomes rarefied, so that any volume of hot air weighs less than the corresponding volume of air at a lower temperature. If, then, the air inside the balloon be so heated that it, together with the balloon, weighs less than the air displaced, the balloon will rise till it arrives at such a height that it, and the enclosed air are equal in weight to that of the displaced air, when equilibrium will be obtained. In Montgolfier's first balloon, no source of heat was taken up with it, so that the air inside rapidly cooled, and the balloon soon descended.

Ascent of the first air-balloon.

The news of the experiment at Annonay rapidly spread over Europe, and at Paris attracted so much attention that M. Faujas de Saint-Fond, a naturalist, set on foot a subscription for paying the expense of repeating the experiment. The balloon was constructed by two brothers of the name of Robert, under the superintendence of M. Charles, professor of natural philosophy in Paris, and afterwards a member of the Academy of Sciences. It had at first been suggested to copy the process of Montgolfier, but Charles proposed the application of hydrogen gas, which was adopted. The filling of the balloon, which was made of thin silk varnished with a solution of elastic gum, and was about 13 feet in diameter, was commenced on August 23, 1783, in the Place des Victoires. The hydrogen gas was obtained by the action of dilute sulphuric acid upon iron filings, and was introduced through leaden pipes; but as the gas was not passed through cold water, great difficulty was experienced in filling the balloon completely; and altogether about 500 lb of sulphuric acid and twice that amount of iron filings were used. Bulletins were issued daily of the progress of the inflation; and the crowd was so great that on the 26th the balloon was moved to the Champ de Mars, a distance of 2 miles. This was done secretly, in the middle of the night, to avoid the crowd; and the appearance of the balloon being thus removed, preceded by lighted torches and escorted by a detachment of soldiers, is described as having been very remarkable. On the next day, August 27, an immense concourse of people covered the Champ de Mars, and every spot from which a view could be obtained was crowded. About five o'clock a cannon was discharged as the signal for the ascent, and the balloon when liberated rose to the height of about 3000 feet with great rapidity. A shower of rain which began to fall directly after the balloon had left the

earth in no way checked its progress; and the excitement was so great, that thousands of well-dressed spectators, many of them ladies, stood exposed, watching it intently the whole time it was in sight, and were drenched to the skin. The balloon, after remaining in the air for about three-quarters of an hour, fell in a field near Gonesse, about 15 miles off, and terrified the peasantry so much that it was torn into shreds by them. Hydrogen gas was at this time known by the name of inflammable air; and balloons inflated with gas have ever since been called by the people air-balloons, the kind invented by the Montgolfiers being designated fire-balloons. French writers have also very frequently styled them after their inventors, *Charlières* and *Montgolfières*.

On the 19th of September 1783 Joseph Montgolfier repeated the Annonay experiment at Versailles, in the presence of the king, the queen, the court, and an immense number of spectators. The inflation was commenced at one o'clock, and completed in eleven minutes, when the balloon rose to the height of about 1500 feet, and descended after eight minutes, at a distance of about two miles, in the wood of Vaucresson. Suspended below the balloon, in a cage, had been placed a sheep, a cock, and a duck, which were thus the first aerial travellers. They were quite uninjured, except the cock, which had its right wing hurt in consequence of a kick it had received from the sheep; but this took place before the ascent. The balloon, which was painted with ornaments in oil colours, had a very showy appearance. See Plate I.

The first human being who ascended in a balloon was M. Francois Pilâtre de Rozier, a young naturalist, who, two years afterwards, was killed in an attempt to cross the English Channel in a balloon. On October 15, 1783, and following days, he made several ascents (generally alone, but once with a companion, M. Girond de Villette), in a captive balloon (i.e., one attached by ropes to the ground), and demonstrated that there was no difficulty in taking up fuel and feeding the fire, which was kindled in a brazier suspended under the balloon, when in the air. The way being thus prepared for aerial navigation, on November 21, 1783, M. Pilâtre de Rozier and the Marquis d'Arlandes first trusted themselves to a free fire-balloon. The experiment was made from the Jardin du Chateau de la Muette, in the Bois de Boulogne. The machine employed, which was a large fire-balloon, was inflated at about two o'clock, and leaving the earth at this time, it rose to a height of about 500 feet and passing over the Invalides and the Ecole Militaire, descended beyond the Boulevards, about 9000 yards from the place of ascent, having been between twenty and twenty-five minutes in the air. The result was completely successful; and it is scarcely necessary to add, the excitement in Paris was very great.

Only ten days later, viz., on December 1, 1783, MM. Charles and Robert ascended from Paris in a balloon inflated with hydrogen gas. The balloon, as in the case of the small one of the same kind previously launched from the Champ de Mars, was constructed by the brothers Robert. It was 27 feet in diameter, and the car was suspended from a hoop surrounding the middle of the balloon, and fastened to a net which covered the upper hemisphere. The balloon ascended very gently from the Tuileries at a quarter to two o'clock, and after remaining for some time at an elevation of about 2000 feet, it descended in about two hours at Nesle, a small town about 27 miles from Paris, when M. Robert left the car, and M. Charles made a second ascent by himself. He had intended to have replaced the weight of his companion by a nearly equivalent quantity of ballast; but not having any suitable means of obtaining such ready at the place of descent, and it being just upon sunset, he gave the wren-

Ascent of a sheep, a cock, and a duck.

Ascent of M. Pilâtre de Rozier and the Marquis d'Arlandes.

Ascent of MM. Charles and Robert in a balloon inflated with hydrogen gas. See Plate I.



to let go, and the balloon being thus so greatly lightened, ascended very rapidly to a height of about 2 miles. After staying in the air about half-an-hour, he descended 3 miles from the place of ascent, although he believed the distance traversed, owing to different currents, to have been about 9 miles. In this second journey M. Charles experienced a violent pain in his right ear and jaw, no doubt produced by the rapidity of the ascent. He also witnessed the phenomenon of a double sunset on the same day; for when he ascended, the sun had set in the valleys, and as he mounted he saw it rise again, and set a second time as he descended.

All the features of the modern balloon as now used are more or less due to Charles, who invented the valve at the top, suspended the car from a hoop, which was itself attached to the balloon by netting, &c. The M. Robert who accompanied him in the ascent was one of the brothers who had constructed it.

On January 19, 1784, the largest balloon on record (if the contemporary accounts are correct) ascended from Lyons. It was more than 100 feet in diameter, about 130 feet in height, and when distended had a capacity, it is said, of over half-a-million cubic feet. It was called the *Flesselles* (from the name of its proprietor or owner, we believe), and after having been inflated from a straw fire in seventeen minutes, it rose with seven persons in the car, viz., Joseph Montgolfier, Pilâtre de Rozier, Count de Laurencin, Count de Dampierre, Prince Charles de Ligne, Count de Laport d'Anglefort, and M. Fontaine, the last gentleman having leaped into the car just as the machine had started. The fire was fed with trusses of straw, and the balloon rose majestically to the height of about 3000 feet, but descended again after the lapse of about a quarter of an hour from the time of starting, in consequence of a rent in the upper part.

It is proper here to state that researches on the use of gas for inflating balloons seem to have been carried on at Philadelphia nearly simultaneously with the experiments of the Montgolfiers; and when the news of the latter reached America, Messrs Rittenhouse and Hopkins, members of the Philosophical Academy of Philadelphia, constructed a machine consisting of forty-seven small hydrogen gas-balloons attached to a car or cage. After several preliminary experiments, in which animals were let up to a certain height by a rope, a carpenter, one James Wilcox, was induced to enter the car for a small sum of money; the ropes were cut, and he remained in the air about ten minutes, and only then effected his descent by making incisions in a number of the balloons, through fear of falling into the river, which he was approaching.

The improvements that have been made in the management and inflation of balloons in the last ninety years have only had reference to details, so that as far as essential principles are concerned the subject is now in pretty much the same state as it was in 1783. We have therefore arrived at a point in the history of the balloon where it is well to consider how much the Montgolfiers and Charles owed to their predecessors; and it is proper here to state that, although we have assigned the invention to the two brothers, Stephen and Joseph—as no doubt they both conducted the early experiments together—still there is reason to believe that the share of the latter was very small. Stephen, however, although the originator of balloons, does not appear ever to have ascended himself, and Joseph did not repeat the ascent just mentioned in the *Flesselles*. The Montgolfiers had studied Priestley's *Experiments relating to different kinds of Air*, whence they first conceived the possibility of navigating the atmosphere; but their experiment was so simple as to require scarcely any philosophical knowledge. They had seen smoke ascend,

and thought that if they could imprison it in a bag, the bag might ascend too; and the observation and reasoning were both such as might occur to anybody. This does not detract from their merit; it, on the contrary, adds to it. The fact that millions of persons must have observed the same thing, and had not derived anything practical therefrom, only enhances the glory of those who in such well-worn tracts did make a discovery; but the simplicity of the invention shows that it is needless to inquire whence the brothers were led to make it, and how far any part of the credit is due to their predecessors. It is scarcely possible to imagine anything more remarkable than that the fact that a light bag held over a fire would ascend into the air was not discovered till 1783, notwithstanding that men in all ages had seen smoke ascend from fire (though, of course, the fire-balloon does not ascend for exactly the same reason that smoke does). It might be supposed that the connection of the Montgolfiers with a paper manufactory gave them facilities for constructing their experimental balloons of thin paper; and perhaps such was the case, although we can find no evidence of it. With regard to Charles's substitution of hydrogen gas, there are anticipations that must be noticed. As early as 1766 Cavendish showed that this gas was at least seven times lighter than ordinary air, and it immediately occurred to Dr Black, of Edinburgh, Dr Black's well known as the discoverer of latent heat, that a thin bag filled with hydrogen gas would rise to the ceiling of a room. He provided, accordingly, the allantois of a calf, with the view of showing at a public lecture such a curious experiment; but for some reason it seems to have failed, and Black did not repeat it, thus allowing a great discovery, almost within his reach, to escape him. Several years afterwards a similar idea occurred to Tiberius Cavallo, Cavallo who found that bladders, even when carefully scraped, are too heavy, and that China paper is permeable to the gas. But in 1782, the year before the invention of the Montgolfiers, he succeeded in elevating soap-bubbles by inflating them with hydrogen gas. The discovery of fire-balloons might have taken place almost at any time in the world's history, but the substitution of hydrogen gas for heated air could not have been made previously to the latter half of the last century; and although all the honour of an independent discovery belongs to the Montgolfiers, Charles, by his substitution of "inflammable air" for heated air, merely showed himself acquainted with the state of chemical science of his day. Charles never again ascended after his double expedition on the 1st of December 1783.

We now return to the history of aerial navigation, and commence with an account of the first ascents of balloons in this country. Although the news of the Annonay and subsequent experiments in France rapidly spread all over Europe, and formed a topic of general discussion, still it was not till five months after the Montgolfiers had first publicly sent a balloon into the air that any aerostatic experiment was made in England. In November 1783 Count Zambecari, an Italian, who happened to be in London, made a balloon of oil-silk, 10 feet in diameter, and weighing 11 lb. It was publicly shown for several days, and on the 25th it was three-quarters filled with hydrogen gas, and launched from the Artillery ground at one o'clock. It descended after two hours and a half near Petworth, in Sussex, 48 miles from London. This was the first balloon that ascended from English ground. On February 22, 1784, a hydrogen gas balloon, 5 feet in diameter, was let up from Sandwich, in Kent, and descended at Warneton, in French Flanders, 75 miles distance. This was the first balloon that crossed the Channel. The difficulties and dangers of aerial navigation having been surmounted by the end of the year

Ascent of seven persons at Lyons.

American aerostatic experiment in 1783.

Remarks on the discovery of the balloon.

First ascents of balloons in England.

1783, the ascents of balloons were now multiplied in all quarters. It will therefore be sufficient to notice very briefly only the more remarkable of the succeeding ascents.

Andreani.

The Chevalier Paul Andreani, of Milan, constructed a fire-balloon 68 feet in diameter, and on February 25, 1784, ascended from Milan with two brothers of the name of Gerli, and remained in the air for about twenty minutes. This is usually regarded as the first ascent in Italy (but see Monck Mason's *Aeronautica*, p. 247). Andreani ascended again on March 13, with two other persons.

Blanchard.

On the 2d of March M. Jean Pierre Blanchard, who had been for some years before occupied with projects for flying, made his first voyage from Paris in a balloon 27 feet in diameter, and descended at Billancourt, near Sévres. Just as the balloon was about to ascend, a young man jumped into the car, and, drawing his sword, declared his determination to ascend with Blanchard. He was ultimately removed by force. The episode is worth noting, as it has sometimes been stated that the young man was Napoleon Bonaparte, but this is untrue; his name was Dupont de Chambon. Blanchard made subsequently, it is said, more than thirty aerial voyages, and he is one of the most celebrated of the earlier aeronauts. He also crossed the English Channel, as noticed further on.

On July 15, 1784, the Duc de Chartres and the two brothers Robert ascended from St Cloud; but the neck of the balloon becoming choked up with an interior balloon filled with common air, intended to regulate the ascending and descending power, they were obliged to make a hole in the balloon, in order to allow of the escape of the gas, but they descended in safety.

Tytler.

The first person who rose into the air from British ground appears to have been Mr J. Tytler,<sup>1</sup> who ascended from the Comely Gardens, Edinburgh, on August 27, 1784, in a fire-balloon of his own construction. He descended on the road to Restalrig, about half-a-mile from the place where he rose. A brief account appeared in a letter, under date August 27, in the *London Chronicle*, and we have seen a picture of the balloon copied in some journal from a "ticket in the British Museum." Mr Tytler's claims were for a long time entirely overlooked, the honour being invariably assigned to Lunardi, till attention was called to them by Mr Monck Mason in 1838. After Lunardi's successful ascents in 1785, Mr Tytler addressed a set of verses to him (quoted in *Astra Castra*, p. 108), in a note, to which he gives a modest account of his own "misfortunes," describing his two "leaps." This is, perhaps, the most correct name for them, as his apparatus having been damaged at different times, he merely heated the air in the balloon, and went up without any furnace, being seated in an ordinary basket for carrying earthenware. He reached a height of from 350 to 500 feet.

Lunardi.

Although by a few days Tytler has the precedence, still his attempts and partial success were all but totally unknown; whereas Lunardi's experiments excited an enormous amount of enthusiasm in London, and it was he that practically introduced aerostation into this country in the face of very great disadvantages. We have already referred to the extraordinary apathy displayed in England with regard to aerostatic experiments, one consequence of which was that their introduction was due to a foreigner. Vincent Lunardi was secretary to Prince Caramanico, the Neapolitan ambassador, and his published letters to his guardian, the Chevalier Compagni, written while he was carrying out his project, and detailing all the difficulties, &c., he met with as they occurred, are very interesting, and give a

See Plate I. vivid account of the whole matter. His balloon was 33

feet in circumference, and was exposed to the public view at the Lyceum in the Strand, where it was visited by upwards of 20,000 people. It was his original intention to have ascended from Chelsea Hospital, but the conduct of a crowd at a garden at Chelsea, which destroyed the fire-balloon of a Frenchman named De Moret, who announced an ascent on August 11, but was unable to keep his word, led to the withdrawal of the leave that had been granted. Ultimately, after some difficulties had been arranged, he was permitted to ascend from the Artillery ground, and on September 15, 1784, the inflation with hydrogen gas took place. It was intended that Mr Biggin, an English gentleman, should accompany Lunardi; but the crowd becoming impatient, the latter judged it prudent to ascend with the balloon only partially full rather than risk a longer delay, and accordingly Mr Biggin was obliged to leave the car. Lunardi therefore ascended alone, in presence of the Prince of Wales and an enormous crowd of spectators. He took up with him a pigeon, a dog, and a cat, and the balloon was provided with oars, by means of which he hoped to raise or lower it at pleasure. Shortly after starting, the pigeon escaped, and one of the oars became broken and fell to the ground. In about an hour and a half he descended at South Mimms, in Hertfordshire, and landed the cat, which had suffered from the cold: he then ascended again, and descended, after the lapse of about three-quarters of an hour, at Standon, near Ware, where he had great difficulty in inducing the peasants to come to his assistance; but at length a young woman, taking hold of one of the cords, urged the men to follow her example, which they then did. The excitement caused by this ascent was immense, and Lunardi at once became the star of the hour. He was presented to the king, and was courted and flattered on all sides. To show the enthusiasm displayed by the people during his ascent, he tells himself, in his sixth letter, how a lady, mistaking the car which fell for himself, was so affected by his supposed destruction that she died in a few days; but, on the other hand, he says he was told by the judges "that he had certainly saved the life of a young man who might possibly be reformed, and be to the public a compensation for the death of the lady;" for the jury were deliberating on the fate of a criminal, whom they must ultimately have condemned, when the balloon appeared, and every one became inattentive, and to save time they gave a verdict of acquittal, and the whole court came out to view the balloon. The king also was in conference with his ministers; but on hearing that the balloon was passing, he broke up the discussion, remarking that they might resume their deliberations, but that perhaps they might not see Lunardi again; upon which he, Mr Pitt, and the other ministers viewed the balloon through telescopes. The balloon was afterwards exhibited in the Pantheon. In the latter part of the following year (1785) Lunardi made several very successful ascents from Kelso, Edinburgh, and Glasgow (in one of which he traversed a distance of 110 miles): these he has described in a second series of letters. He subsequently returned to Italy, where we believe he still followed the practice of aerostation, and made many ascents. He died on July 31, 1806, at Lisbon, according to the *Gentleman's Magazine*, but a contemporary newspaper gives Genoa as the place, and adds that he died in a state of very great indigence.

Lunardi's example was soon followed by others, and on October 16, 1784, Blanchard ascended from Little Chelsea with Mr Sheldon, and having deposited the latter at Sunbury, rose again alone, and descended at Romney Marshes. On November 12, Mr James Sadler, sen., ascended from Oxford, and there is every reason to believe that he made a previous ascent from the same place on October 12. four

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<sup>1</sup> Mr Tytler contributed largely to, and, indeed, appears to have been virtually editor of, the second edition (1778-83) of the *Encyclopædia Britannica*.



days previous to Blanchard's (see Monck Mason, p. 274, where it is stated that he attempted to ascend in a fire-balloon on September 12, but that the balloon was burnt). On November 30, 1784, Blanchard again ascended, accompanied this time by Dr J. Jeffries, an American physician. On January 4, 1785, Mr Harper ascended from Birmingham; and on January 7, Blanchard and Dr Jeffries achieved the feat of crossing the Channel from Dover to Calais. At seven minutes past one the balloon left Dover Castle, and in their passage they had a most magnificent view of both shores. When about one-third across they found themselves descending, and threw out every available thing from the boat or car. When about three-quarters across they were descending again, and had to throw out not only the anchor and cords, but also to strip and throw away part of their clothing, after which they found they were rising, and their last resource, viz., to cut away the car, was rendered unnecessary. As they approached the shore the balloon rose, describing a magnificent arch high over the land. They descended in the forest of Guinnes.

On March 23, 1785, Count Zambeccari, who had, as we have seen, launched the first balloon from English ground, ascended for the first time with Admiral Vernon from London. Shortly afterwards he returned to his own country, and there applied himself assiduously to the practice of aerial navigation. He twice, in 1803 and 1804, descended into the Adriatic, and both times only escaped after undergoing much danger. Descending in a fire-balloon on September 21, 1812, after a voyage from Bologna, the shock of the grapnel catching in a tree caused the balloon to catch fire; and to save themselves from being burnt, Zambeccari and his companion, Signor Bonaga, leaped from the car. The former was killed on the spot, but the latter, though fearfully injured, escaped with his life.

On June 16, 1785, Pilâtre de Rozier made his last fatal voyage from Boulogne. It was his intention to have repeated the exploit of Blanchard and Jeffries in the reverse direction, and have crossed from Boulogne to England. For this purpose he had contrived a double balloon, which he expected would combine the advantages of both kinds—a fire-balloon, 10 feet in diameter, being placed underneath a gas-balloon of 37 feet in diameter, so that by increasing or diminishing the fire in the former it might be possible to ascend or descend without waste of gas. Rozier was accompanied by M. P. A. Romain, and for rather less than half-an-hour after the aerostat ascended all seemed to be going on well, when suddenly the whole apparatus was seen in flames, and the unfortunate adventurers came to the ground from the supposed height of more than 3000 feet. Rozier was killed on the spot, and Romain only survived about ten minutes. A monument was erected on the place where they fell, which was near the sea-shore, about four miles from the starting-point. The Marquis de la Maisonfort had accompanied Rozier to Boulogne, intending to ascend with him, but M. Romain there insisted on a prior promise. Either the upper balloon must have been reached by the flames, and the gas taken fire, or the gas must have poured down into the lower balloon, and so have caused the explosion.

We must not omit to mention that on June 4, 1784, Madame Thible ascended from Lyons in a fire-balloon with M. Fleuraud, in the presence of King Gustavus of Sweden, then travelling under the name of Count Haga. Madame Thible is very likely the only woman who ever ascended in a fire-balloon. The first Englishwoman who ever ascended into the air was Mrs Sage, who accompanied Mr Biggin in his voyage from London on June 29, 1785.

Accounts are given of an ascent at Constantinople, made in the presence of the Sultan, by a Persian physician,

accompanied by two Bostangia, early in the year 1786, who, crossing the sea which divides Europe from Asia, descended about 30 leagues from the coast.

We have now given a brief account of all the noteworthy voyages that took place within the first two or three years after the discovery of the balloon by Montgolfier. Ascents were multiplied from this time onwards, and it is impossible to give even a list of the many hundreds that have taken place since: this omission is, however, of slight importance, as henceforth the balloon became little better than a toy, let up to amuse people at fêtes or other public occasions. When the first ascents were made in France, the glow of national vanity was lighted up, and the most brilliant expectations were felt with regard to aerostation, and the glory to the nation that would accrue therefrom. These anticipations have not been realised, and the balloon at this moment has received no great improvement since the time of Charles, except the substitution of ordinary coal-gas for hydrogen, which has rendered the inflation of a balloon at any gas-works a comparatively simple matter, bearing in mind the elaborate contrivances required for the generation of hydrogen in sufficient quantities. But in one respect the balloon has been of real service, viz., to science, in rendering the attainment of observations in the higher strata of the atmosphere not only possible but practicable. In regard to such matters the balloon is unique, as the atmosphere is the great laboratory of nature, in which are produced all the phenomena of weather, the results of which we perceive on the earth; and no observations made on mountain-sides can take the place of those made in the balloon, as what is required is the knowledge of the state of the upper atmosphere itself, free from the disturbing effects of the contiguity of the land. Although, therefore, in what follows, we shall notice any particularly remarkable ascents, we shall chiefly confine ourselves to the few that have been undertaken for the sake of advancing science, and which alone are of permanent value. It will be necessary to make one exception to this rule, however, in the case of the parachute, the experiments with which require some notice, although they have been put to no useful purpose. The balloon has also been used in warfare as a means of observing the movements of the enemy; and the applications of it to this purpose deserve notice, although we think not so much use has been made of the balloon in this direction as might have been.

The substitution of coal-gas for hydrogen is due to Mr Charles Green, the veteran aeronaut, who made several hundred ascents, the first of which took place on July 19, 1821, the coronation day of George IV. In this ascent ordinary coal-gas was first used; and every balloon, with very few exceptions, that has ascended since this date has been so inflated. Pall Mall was first lighted by gas in 1807, and at the end of 1814 the general lighting of London by gas commenced; so that coal-gas could not have been available for filling balloons long before it was actually used.

Leaving out of consideration the ascents undertaken for scientific objects (very many of which were remarkable for the height attained or the distance traversed, and which will be specially noticed further on), we proceed to mention the most noteworthy ascents that have taken place and that have not ended fatally (these latter will be referred to separately). Mr Crosbie, a gentleman who was the first to ascend from Ireland (January 19, 1785), on the 19th July 1785 attempted to cross St George's Channel to England, but fell into the sea; he was saved by some vessels that came to his rescue. Lunardi also fell into the sea, about a mile and a half from the shore, after an ascent from Edinburgh in December 1785; he was rescued by a fishing-boat. Richard Maguire was the second person

Most of the subsequent ascents were merely undertaken for pleasure, and of no permanent value.

Substitution of coal-gas for hydrogen by Mr Green

Subsequent famous ascents (non-scientific).

who ascended from Ireland. Mr Crosbie had inflated his balloon on May 12, 1785, but it was unable to take him up, when Mr Maguire, a student at the university, who was present, offered to ascend. His offer was accepted, and he made the ascent. For this he was knighted by the Lord-Lieutenant (Monck Mason, p. 266). On July 22, 1785, Major Money ascended from Norwich. The balloon was blown out to sea, and he was obliged to descend into the water. After remaining there seven hours he was rescued by a revenue cutter which had been despatched to his assistance. Mr James Sadler attempted to cross St George's Channel on the 1st of October 1812, and had nearly succeeded, when, in consequence of a change in the wind, he was forced to descend into the sea off Liverpool. After remaining in the water some time, he was rescued by a fishing-boat. But on July 22, 1817, Mr Windham Sadler, his second son, succeeded in crossing the Channel from Dublin to Holyhead. On May 24, 1837, Mr Sneath ascended from near Mansfield in a fire-balloon, and descended safely. At half-past one o'clock on November 7, 1836, Mr Robert Hollond, Mr Monck Mason, and Mr Charles Green ascended from Vauxhall Gardens, and descended at about two leagues from Weilburg, in the duchy of Nassau, at half-past seven the next morning, having thus traversed a distance of about 500 miles in 18 hours; Liège was passed in the course of the night, and Coblenz in the early morning. A full account of this trip is given by Mr Monck Mason in his *Aeronautica* (1838). The balloon in which the journey was performed (a very large one, containing about 85,000 cubic feet of gas), was subsequently called the *Nassau Balloon*, and under that name became famous, and ascended frequently.



The Great Nassau Balloon.

Equestrian  
ascents.

We ought also, perhaps, to notice a curious ascent made by Mr Green on July 29, 1828, from the Eagle Tavern, City Road, on the back of a favourite pony. Underneath the balloon was a platform (in place of a car) containing places for the pony's feet, and some straps went loosely under his body, to prevent his lying down or moving about.

Everything passed off satisfactorily, the balloon descending safely at Beckenham; the pony showed no alarm, but quietly ate some beans with which its rider supplied it in the air. Equestrian ascents have since been repeated. In 1852, Madame Poitevin, who had made several such journeys in Paris, ascended from Cremorne Gardens, London, on horseback (as "Europa on a bull"); but after the first journey its repetition was stopped in England by application to the police courts, as the exhibition outraged public feeling. Lieutenant Gale was killed at Bordeaux on Sept. 8, 1850, in descending after an equestrian ascent, through mismanagement in landing of the horse. M. Poitevin, descending in 1858, after an equestrian ascent from Paris, was nearly drowned in the sea near Malaga. Among remarkable balloon ascents must also be noticed that of Mr Wise, from St Louis, on June 23, 1859, in which a distance of 1120 miles was traversed.

In 1863, Nadar, a well-known photographer at Paris, Nadar's constructed an enormous balloon, which he called "Le balloon Géant." It was the largest gas-balloon ever constructed, containing over 200,000 cubic feet of gas. Underneath it was placed a smaller balloon, called a compensator, the object of which was to prevent loss of gas during the voyage. The car had two stories, and was, in fact, a model of a cottage in wicker-work, 8 feet in height by 13 feet in length, containing a small printing-office, a photographic department, a refreshment-room, a lavatory, &c. The first ascent took place at five o'clock on Sunday, October 4, 1863, from the Champ de Mars. There were thirteen persons in the car, including one lady, the Princess de la Tour d'Auvergne, and the two aeronauts Louis and Jules Godard. In spite of the elaborate preparations that had been made and the stores of provisions that were taken up, the balloon descended at nine o'clock, at Meaux, the early descent being rendered necessary, it was said, by an accident to the valve-line. A second ascent was made a fortnight later, viz., on October 18; there were nine passengers, including Madame Nadar. The balloon descended at the expiration of seventeen hours, near Nienburg in Hanover, a distance of about 400 miles. A strong wind was blowing, and the balloon was dragged over the ground a distance of 7 or 8 miles. All the passengers were bruised, and some more seriously hurt. The balloon and car were then brought to England, and exhibited for some time at the Crystal Palace at the end of 1863 and beginning of 1864. The two ascents of Nadar's balloon excited an extraordinary amount of enthusiasm and interest, vastly out of proportion to what they were entitled to. The balloon was larger than any of the same kind that had previously ascended; but this was scarcely more than just appreciable to the eye, as the doubling the contents of a balloon makes comparatively slight addition to its diameter. M. Nadar's idea was to obtain sufficient money, by the exhibition of his balloon, to carry out a plan of aerial locomotion he had conceived possible by means of the principle of the screw; in fact, he spoke of "Le Géant" as "the last balloon." He also started *L'Aéronaute*, a newspaper devoted to acrostation, and published a small book, which was translated into English under the title *The Right to Fly*. Nadar's ascents had not the remotest connection with science, although he claimed that they had; nor was his knowledge, as shown in his writings, sufficient to have enabled him to advance it in any way.

Directly after Nadar's two balloon ascents, M. Eugene Eugene Godard constructed what was perhaps the largest aerial Godard's machine that has ever been made. It was a Montgolfier or Godard's large fir- balloon, of nearly half-a-million cubic feet capacity (more than double the capacity of Nadar's). The balloon Flesselles, 1783, is said to have slightly exceeded this size. The air was heated by an 18 foot stove, weigh-



ing, with the chimney, 980 lb. This furnace was fed by straw; and the "car" consisted of a gallery surrounding it. Two ascents of this balloon were made from Cremorne Gardens, on July 20 and July 28, 1864. After the first journey the balloon descended at Greenwich, and after the second at Walthamstow, where it was injured by being blown against a tree. Notwithstanding the enormous size of the balloon, M. Godard asserted that it could be inflated in half an hour, and the inflation at Cremorne did not occupy more than an hour. The ascent of the balloon was a very striking sight, the flames roaring up the chimney of the furnace into the enormous globe above. The trusses of straw were suspended by ropes from the gallery below the car, and were drawn up and placed in the furnace as required. This was the first fire-balloon seen by the inhabitants of London, and it was the second ascent of this kind that had been made in this country, Mr Sneath's ascent at Mansfield having been the first, as Mr Tytler's experiment at Edinburgh in 1784 was a leap, not an ascent, as no source of heat was taken up. In spite of the rapidity with which the inflation was effected, few who saw the ascent could fail to receive an impression most favourable to the gas-balloon in the matter of safety, as a rough descent, with a heated furnace as it were in the car, could not be other than most dangerous.

In the summer of 1873 the proprietors of the New York *Daily Graphic*, an illustrated paper, determined to construct a very large balloon, and enable Mr Wise, the well-known American aeronaut, to realise his favourite scheme of crossing the Atlantic Ocean to Europe. It was believed by many that a current from west to east existed constantly at heights above 10,000 feet, but this seems very uncertain. Mr Green having stated that he had met with such a current, Mr Glaisher made a point of investigating the directions of the wind at different heights in his ascents, but found that they were as capricious as near the ground. The same result was found by others, and a comparison of the courses of the balloons sent up from Paris during the siege will show that no constant current exists. The American project came to nothing owing to the quality of the material of which the balloon was made. The size was said to be such as to contain 400,000 cubic feet, so that it would lift a weight of 14,000 lb. On September 12, 1873, during its inflation, Mr Wise declared the material of which it was made was so bad that he could not ascend in it, though the other two persons who were to accompany him agreed to go. When, however, 325,000 feet of gas had been put into the balloon, a rent was observed, and the whole rapidly collapsed. Although this accident was greatly regretted at the time, it seems pretty certain, from what subsequently took place, that the aeronauts would not have succeeded in their object, and a serious mishap was probably avoided. On October 6, 1873, Mr Donaldson and two others ascended from New York in the balloon after it had been repaired, and effected a perilous descent in Connecticut. During the autumn of 1873 a great amount of discussion took place both in England and America about the existence of the westerly current and the subject of aerostation. In September 1873 Mr Parnum, the well-known American showman, visited England with the view of eliciting whether, in the opinion of those best qualified, there was sufficient probability of a successful result to induce him to undertake the construction of a suitable balloon.

By aeronauts (omitting the pioneers Lunardi, Zambecari, and others who have been already spoken of) we mean persons who have followed ballooning as a business or trade. Of these, perhaps the best known and most successful have been Blanchard, Garnerin, the Sadlers, Mr Charles Green, Mr Wise, Mr Coxwell, and the brothers

Godard. Blanchard made, it is said, thirty-six ascents, his first having taken place on March 2, 1784. His wife also made many ascents; she was killed on July 7, 1819. Garnerin is said to have ascended more than fifty times; he introduced night ascents with fireworks, &c., the first of which took place on August 4, 1807. We shall have occasion to refer to him again when we treat of parachutes. Mr James Sadler made about sixty ascents, the first of which took place on October 12, 1784. His two sons, John and Windham, both followed in their father's steps; the latter was killed in 1817. In the minds of most Englishmen the practice of ballooning will, for a long time, be associated with the name of Mr Charles Green, the most celebrated of English aeronauts, who, having made his first ascent on July 19, 1821, only died in the year 1870, at a very advanced age. He is credited with 526 ascents by Mr Turnor; and from advertisements, &c., we see that in 1838 he had made 249. Mr Green may be said to have reduced ballooning to routine, and he made more ascents than any other person has ever accomplished. He accompanied Mr Welsh in his scientific ascents, and to him is also due the invention of the *guide rope*, which he used in many of his voyages with success. It merely consisted of a rope not less than 1000 feet in length, which was attached to the ring of the balloon (from which the car is suspended), and hung down so that the end of it was allowed to trail along the surface of the ground, the object being to prevent the continual waste of gas and ballast that takes place in an ordinary balloon journey, as such an expenditure is otherwise always going on, owing to the necessity of keeping the balloon from getting either too high or too low. If a balloon provided with a guide rope sinks so low that a good deal of the rope rests on the earth, it is relieved of so much weight and rises again; if, on the contrary, it rises so high that but a little is supported by the earth, a greater weight is borne by the balloon, and equilibrium is thus produced. Mr Green frequently used the guide rope, and found that its action was satisfactory, and that it did not, as might be supposed, become entangled in trees, &c. It was used in the Nassau journey, but more recent aeronauts have dispensed with it. Still, in crossing the sea or making a very long journey, where the preservation of the gas was of great importance, it could not fail to be valuable. Mr Green had, in his time, more experience in the management than has fallen to the lot of any one else, and he brought to bear on the subject a great amount of skill and practical knowledge. There is also a plain matter-of-fact style about his accounts of his ascents that contrasts very favourably with the writings of some other aeronauts. Mr Coxwell, who has made several hundred ascents, first ascended in 1844, under the name of Wells. He it was who, as aeronaut, accompanied Mr Glaisher in most of his scientific ascents, 1862-65. The Godard family have made very many ascents in France, and are well known in all countries in connection with aeronautics. It was to two of the Godards that the management of the military balloons in the Italian campaign was entrusted; it was M. Jules Godard who succeeded in opening the valve in the dangerous descent of Nadar's balloon in Hanover in 1863, and it was Eugene Godard who constructed perhaps the largest Montgolfier ever made, an account of the ascensions of which has been given above. M. Dupuis Delcourt was also a well-known aeronaut; he has written on the subject of aerostation, and his balloons were employed by MM. Bixio and Barral in their scientific ascents. In America Mr Wise is *par excellence* the aeronaut; he has made several hundred ascents, and many of them are distinguished for much skill and daring. He also appears to have pursued his profession with more energy and capacity than has any other aeronaut in recent times, and his *History*

Projected  
balloon  
voyage  
across the  
Atlantic in  
1873.

Celebrated  
aeronauts.

of *aerostation* shows him to possess much higher scientific attainments than balloonists usually have. In fact, Mr Wise stands alone in this respect, as nearly all professional aeronauts are destitute of scientific knowledge.

Balloon accidents that have terminated fatally.

The number of fatal accidents that have occurred in the history of balloons is not very great, and nearly all have resulted either from the use of the fire-balloon, or from want of knowledge, or carelessness on the part of the aeronauts themselves. We have already referred to the accidents that closed the careers of Pilâtre de Rozier and Zambecari. On November 25, 1802, Signor Olivari, at Orleans, and on July 17, 1812, Herr Bittorff, at Mannheim, perished in consequence of the accidental combustion of their *Montgolfières*. On April 7, 1806, M. Mosment ascended from Lille upon a platform, from which he accidentally fell and was killed. On July 7, 1819, Madame Blanchard ascended from Paris at night with fireworks attached to the car, a spark from one of which ignited the gas in the balloon, and she was precipitated to the ground and killed. Lieut. Harris ascended from London on May 25, 1824, but, through mismanagement of the valve-line, he allowed all the gas to escape suddenly from the balloon, which descended with terrible velocity. He was killed by the fall, but his companion, Miss Stocks, escaped almost uninjured. In an ascent from Blackburn on September 29, 1824, by Mr Windham Sadler, the balloon, in rising, struck against a chimney, and the aeronaut fell over the side of the car and was killed. On July 24, 1837, Mr Cocking descended from a balloon in a parachute, which struck the ground with such violence that he was killed on the spot. In descending with a horse on September 8, 1850, Lieut. Gale was killed; and in 1863 Mr Chambers was killed at Nottingham, his death arising from suffocation by the gas that poured out at the neck of the balloon, which was not separated from the car by a sufficient interval.

The number of persons who have ascended in balloons.

The number of accidents that have occurred bears but a very small proportion to the number of successful ascents that have been made. Mr Monck Mason, in his *Aeronautica*, gives a list of the names, with the dates and places of their ascent, of all persons who, as far as he could find, had ascended previously to 1838. His list contains 471 names, which are distributed among the inhabitants of the different countries as follows:—England, 313; France, 104; Italy, 18; Germany and the German States, 17; Turkey, 5; Prussia, 3; Russia, 2; Poland, 2; Hungary, 2; Denmark, 1; Switzerland, 1; and the United States, 3. Among these are the names of 49 women, of whom 28 are English, 17 French, 3 German, and 1 Italian. Some of the persons had ascended a great number of times; thus Mr Charles Green's ascents alone amounted to more than 249; and those of the members of the same family to 535. Mr Mason calculated that the whole number of ascents executed by Englishmen was 752. Of the 471 adventurers only nine were killed, and of these six owed their fate to the dangers attendant on the use of the fire-balloon, and one to bravado. The great number of our own countrymen that appear in the above list is no doubt partially due to the fact that it was compiled by an Englishman, to whom English newspapers and other records were more accessible; still there is no reason to doubt that a much greater number of Englishmen have ascended than inhabitants of any other country, as balloons as an amusement at fêtes, &c., have been more common here. The number of Englishmen who have ascended might now be estimated at from 1500 to 2000.

We can call to mind but three fatal casualties that have taken place since Mr Mason compiled his list, viz., Mr Cocking's parachute accident, Mr Gale's death in 1850, and Mr Chambers' death in 1863.

Scientific ascents.

We come now to an account of the use to which the balloon has been applied for the advancement of science.

The ascents that have been made are by Sacharof, Biot, and Gay-Lussac in 1804, by Bixio and Barral in 1850, by Mr Welsh in 1852, by Mr Glaisher in 1862-66, and MM. Flammarion and De Fonville in 1867-68. We shall give a brief account of these ascents, because, as has been remarked, with a few exceptions, they form the only useful purpose to which the balloon has been applied. The general description of the phenomena, &c., met with in a high ascent, and the general results found, are referred to in the account of Mr Glaisher's experiments, as not only are his accounts more detailed, but the number of ascents made by him is much in excess of that of all the others put together.

The Academy of Sciences at St Petersburg, entertaining the opinion that the experiments made on mountain-sides by De Luc, De Saussure, Humboldt, and others must give results different from those made in free air at the same heights, resolved in 1803 that a balloon ascent should be made for the purpose of making scientific researches. Accordingly, on January 30, 1804, M. Sacharof, a member of the academy, ascended, with M. Robertson as aeronaut, in a balloon belonging to the latter, which was inflated with hydrogen gas. The ascent was made at a quarter past seven, and the descent effected at a quarter to eleven. No great height was reached, as the barometer never sank below 23 in., corresponding to less than  $1\frac{1}{2}$  mile. The experiments were not very systematically made, and the chief results were the filling and bringing down several flasks of air collected at different elevations, and the supposed observation that the magnetic dip was altered. A telescope was fixed in the bottom of the car pointing vertically downwards, so that the travellers might be able to ascertain exactly the spot over which they were floating at any moment. M. Sacharof found that, on shouting downwards through his speaking-trumpet, the echo from the earth was quite distinct, and at his height was audible after an interval of about ten seconds. M. Sacharof's account is given in the *Philosophical Magazine* (Tilloch's), vol. xxi. pp. 193-200 (1805).

At the commencement of 1804 Laplace proposed to the members of the French Academy of Sciences that balloons should be employed for the purpose of solving certain physical problems, adding that, as the government had placed funds at their disposal for the prosecution of useful experiments, he thought they might be well applied to this kind of research. The proposition was supported by Chaptal the chemist, who was then minister of the interior, and accordingly the necessary arrangements were speedily effected, the charge of the experiments being given to MM. Gay-Lussac and Biot.

The principal object of this ascent was to determine if the magnetic force experienced any appreciable diminution at heights above the earth's surface, De Saussure having found that such was the case upon the Col du Géant. On August 24, 1804, MM. Gay-Lussac and Biot (the former eminent as a chemist and the latter as a natural philosopher) ascended from the Conservatoire des Arts at ten o'clock in the morning. Their magnetic experiments were incommoded by the rotation of the balloon, but they found that, up to the height of 13,000 feet, the time of vibration of a magnet was appreciably the same as on the earth's surface. They found also that the air became drier as they ascended. The height reached was about 13,000 feet, and the temperature declined from 63° Fahr. to 51°. The descent was effected about half-past one, at Meriville, 18 leagues from Paris.

In a second experiment, which was made on September 16, 1804, M. Gay-Lussac ascended alone. The balloon left the Conservatoire des Arts at 9.40 A.M., and descended at 3.45 P.M. between Rouen and Dieppe. The chief result obtained was that the magnetic force like gravitation, did

Ascent of M. Sacharof at St Petersburg, January 30, 1804.

Ascent of Gay-Lussac and Biot, August 24, 1804.

Ascent of M. Gay-Lussac, September 16, 1804.



not experience any sensible variation at heights from the earth's surface which we can attain to. Gay-Lussac also brought down air collected at the height of nearly 23,000 feet; and on analysis it appeared that its constitution was the same as that of air collected at the earth's surface. At the time of leaving the earth the thermometer stood at 82° Fahr., and at the highest point reached (23,000 feet) it was 14°·9 Fahr. Gay-Lussac remarked that at his highest point there were still clouds above him.

From 1804 to 1850 there is no record of any scientific ascents in balloons having been undertaken. In the latter year MM. Bixio and Barral made two ascents for this purpose. They ascended from the Paris Observatory on June 29, 1850, at 10.27 A.M., the balloon being inflated with hydrogen gas. The day was a rough one, and the ascent took place suddenly, without any previous attempt having been made to test the ascensional force of the balloon. When liberated, it rose with great rapidity, and becoming fully inflated it pressed upon the network, bulging out at the top and bottom. As the ropes by which the car was suspended were too short, the balloon soon covered the travellers like an immense hood. In endeavouring to secure the valve-rope, a rent was made in the balloon, and the gas escaped so close to the faces of the voyagers as almost to suffocate them. Finding that they were descending then too rapidly, they threw overboard everything available, including their coats, and only excepting the instruments. The ground was reached at 10h. 45m. near Lagny. Of course no observations were made.

MM. Bixio and Barral determined to ascend again without delay, and accordingly, on July 27, 1850, they repeated the experiment. The ascent was remarkable on account of the extreme cold met with. At about 20,000 feet the temperature was 15° Fahr., the balloon being enveloped in cloud; but on emerging from the cloud, at 23,000 feet, the temperature sank to -38° Fahr., no less than 53° Fahr. below that experienced by Gay-Lussac at the same elevation. The existence of these very cold clouds served to explain certain meteorological phenomena that were observed on the earth both the day before and the day after the ascent. Some pigeons were taken up in this, as in most other high ascents, and liberated; they showed a reluctance to leave the car, and then fell heavily downwards.

In July 1852 the committee of the Kew Observatory resolved to institute a series of balloon ascents, with the view of investigating such meteorological and physical phenomena as require the presence of an observer at a great height in the atmosphere. Mr Welsh, of the Kew Observatory, was the observer, and Mr Green's great Nassau balloon was employed, Mr Green himself being the aeronaut. Four ascents were made in 1852, viz., on August 17, August 26, October 31, and November 10, when the respective heights of 19,510, 19,100, 12,640, and 22,930 feet were attained. A siphon barometer, dry and wet bulb thermometers, aspirated and free, and a Regnault's hygrometer were taken up. Some air collected at a considerable height was found on analysis not to differ appreciably in its composition from air collected near the ground. The original observations are printed *in extenso* in the *Philosophical Transactions* for 1853, pp. 311-346. The lowest temperatures met with in the four ascents were respectively 8°·7 Fahr. (19,380 feet); 12°·4 Fahr. (18,370); 16°·4 Fahr. (12,640); -10°·5 Fahr. (22,370); the decline of temperature being very regular.

At the meeting of the British Association for the Advancement of Science held at Aberdeen in 1859, a committee was appointed for the purpose of making observations in the higher strata of the atmosphere by means of the balloon. For the first two years nothing was effected, owing to the want both of an observer and of a suitable

balloon. In 1861, at Manchester, the committee was reappointed, and it then consisted of Colonel Sykes (chairman), Mr Airy, Sir David Brewster, Mr Fairbairn, Admiral Fitzroy, Mr Gassiot, Mr James Glaisher, Sir J. Herschel, Dr Lee, Dr Lloyd, Dr W. A. Miller, Dr Robinson, and Dr Tyndall. Some unsuccessful experiments were made with a balloon of Mr Green's, and also with one hired from the proprietors of Cremorne Gardens, which turned out to be in a hopelessly leaky condition; the trained observers also, on whom the committee had relied, failed to perform their duties. In this state of affairs, Mr Coxwell, an aeronaut who had made a good many ascents, was communicated with, and he agreed to construct a new balloon, of 90,000 cubic feet capacity, on the condition that the committee would undertake to use it, and pay £25 for each high ascent made especially for the committee, the latter defraying also the cost of gas, &c., so that the expense of each high ascent amounted to nearly £50. An observer being still wanted, Mr Glaisher, a member of the committee, offered himself to Mr Glaisher's ascents, take the observations, and accordingly the first ascent was made on July 17, 1862, from the gas-works at Wolverhampton, this town being chosen on account of its central position in the country. Altogether, Mr Glaisher made twenty-eight ascents, the last having taken place on May 26, 1866. Of these only seven were specially high ascents, although six others were undertaken for the objects of the committee alone. On the other occasions Mr Glaisher availed himself of public ascents from the Crystal Palace and other places of entertainment, merely taking his place like the other passengers. In the last six ascents another aeronaut, Mr Orton, and a smaller balloon, were employed. The dates, places of ascent, and greatest heights (in feet) attained in the twenty-eight ascents were—1862: July 17, Wolverhampton, 26,177; July 30, Crystal Palace, 6937; August 18, Wolverhampton, 23,377; August 20, Crystal Palace, 5900; August 21, Hendon, 14,355; September 1, Crystal Palace, 4190; September 5, Wolverhampton, 37,000; September 8, Crystal Palace, 5428. 1863: March 31, Crystal Palace, 22,884; April 18, Crystal Palace, 24,163; June 26, Wolverton, 23,200; July 11, Crystal Palace, 6623; July 21, Crystal Palace, 3298; August 31, Newcastle-upon-Tyne, 8033; September 29, Wolverhampton, 16,590; October 9, Crystal Palace, 7310. 1864: January 12, Woolwich, 11,897; April 6, Woolwich, 11,075; June 13, Crystal Palace, 3543; June 20, Derby, 4280; June 27, Crystal Palace, 4898; August 29, Crystal Palace, 14,581; December 1, Woolwich, 5431; December 30, Woolwich, 3735. 1865: February 27, Woolwich, 4865; October 2, Woolwich, 1949; December 2, Woolwich, 4628. 1866: May 26, Windsor, 6325. Of these, all the ascents from Wolverhampton (four in number) and from Woolwich (seven in number) were undertaken wholly for the committee, and Mr Glaisher was merely accompanied by the aeronaut, whose business it was to manage the balloon. The expense of the special high ascents (about £50 for each, as stated above) rendered it desirable, when possible, to take advantage of the desire felt by many to accompany Mr Glaisher in his journey, and admit one or two other travellers; and of this kind were one or two of the ascents from the Crystal Palace, though the majority, in which the elevation attained frequently fell short of a mile, were the ordinary public ascents advertised beforehand. It is not possible here to give any complete account of the results obtained, and it would be superfluous, as the observations, both as made and after reduction, are printed in the *British Association Reports*, 1862-66. It will be enough, after explaining the objects of the experiments, &c., to describe briefly one or two of the most remarkable ascents, and then state the kind of conclusions that follow from them as a whole.

Ascent of  
MM. Bixio  
and Barral  
on June  
29, 1850.

On July  
27, 1850.

Mr Welsh's  
four ascents in  
1852.

British Association  
appoints  
balloon  
committee.

Objects of the experiments.

The primary object was to determine the temperature of the air, and its hygrometrical state at different elevations to as great a height as could be reached; and the secondary objects were—(1) to determine the temperature of the dew-point by Daniell's and Regnault's hygrometers, as well as by the dry and wet bulb thermometers, and to compare the results; (2) to compare the readings of an aneroid barometer with those of a mercurial barometer up to the height of 5 miles; (3) to determine the electrical state of the air, (4) the oxygenic condition of the atmosphere, and (5) the time of vibration of a magnet; (6) to collect air at different elevations; (7) to note the height and kind of clouds, their density and thickness; (8) to determine the rate and direction of different currents in the atmosphere; and (9) to make observations on sound.

Instruments and apparatus.

The instruments used were mercurial and aneroid barometers, dry and wet bulb thermometers, Daniell's dew-point hygrometer, Regnault's condensing hygrometer, maximum and minimum thermometers, a magnet for horizontal vibration, hermetically sealed glass tubes exhausted of air, and an electrometer. In one or two of the ascents a camera was taken up.

Observing arrangements.

One end of the car was occupied by the aeronaut; near the other, in front of Mr Glaisher, was placed a board or table, the extremities of which rested on the sides of the car; upon this board was placed suitable framework to carry the several thermometers, hygrometers, magnet, aneroid barometer, &c.; a perforation through it admitted the lower branch of the mercurial barometer to descend below, leaving the upper branch at a convenient height for observing. A watch was placed directly opposite to Mr Glaisher, the central space being occupied by his notebook. The aspirator (for Regnault's hygrometer) was fixed underneath the centre of the board, so as to be conveniently workable by either feet or hands. Holes were cut in the board to admit the passage of the flexible tubes required for Regnault's hygrometer and the dry and wet bulb thermometers.

Mr Glaisher's ascent on July 17, 1862.

The first ascent was made, as has been stated, from Wolverhampton on July 17, 1862, and the journey was mercurial on account of a warm current that was met with at a great elevation. The weather, previous to the ascent, had been bad for a long time, and it had been delayed in consequence. The wind was still blowing from the west, and considerable difficulty was experienced in the preliminary arrangements, so that no instrument was fixed before starting. The balloon left at 9.43 a.m., and a height of 3800 feet was reached before an observation could be taken. At 4000 feet clouds were entered, and left at 8000 feet. The temperature of the air at starting was 59° Fahr., at 4000 feet it was 45°, and it descended to 26° at 10,000 feet, from which height to that of 13,000 feet there was no diminution. While passing through this space Mr Glaisher put on additional clothing, feeling certain that a temperature below zero would be attained before the height of 5 miles was reached; but at the elevation of 15,500 feet the temperature was 31°, and at each successive reading, up to 19,500, it increased, and was there 42°. The temperature then decreased rapidly, and was 16° at 26,000 feet. On descending it increased regularly to 37°·8 at 10,000 feet. A very rough descent, in which nearly £50 worth of instruments were broken, was effected near Oakham, in Rutlandshire, Mr Coxwell having judged it prudent to descend on account of the proximity, as he supposed, of the Wash. In coming down, a cloud was entered at an elevation of 12,400 feet, and proved to be more than 8000 feet in thickness. The rise of temperature met with in this ascent was most remarkable.

The weather on the day (Aug. 18, 1862) of the third ascent was favourable, and there was but little wind. All the

instruments were fixed before leaving the earth. A height of more than 4 miles was attained, and the balloon remained in the air about two hours. When at its highest point there were no clouds between the balloon and the earth, and the streets of Birmingham were distinctly visible. The descent was effected at Solihull, 7 miles from Birmingham. On the earth the temperature of the air was 67°·8, and that of the dew-point 54°·6; and they steadily decreased to 39°·5 and 22°·2 respectively at 11,500 feet. The balloon was then made to descend to the height of about 3000 feet, when both increased to 56°·0 and 47°·5 respectively. On throwing out ballast the balloon rose again, and the temperature declined pretty steadily to 24°·0, and that of the dew-point to -10°·0, at the height of 23,000 feet. During this ascent Mr Glaisher's hands became quite blue, and he experienced a qualmish sensation in the brain and stomach, resembling the approach of sea-sickness; but no further inconvenience, besides such as resulted from the cold and the difficulty of breathing, was experienced. This feeling of sickness never occurred again to Mr Glaisher in any subsequent ascent.

The ascent from the Crystal Palace on August 20, 1862, was merely an ordinary one for the public amusement, in which Mr Glaisher took a place in the car. In these low ascents from places of entertainment, in which other persons also were passengers, the large board stretching right across the car could not be used. A smaller frame was therefore made, which could be screwed on to the edge of the car, to carry the watch, siphon barometer, aneroid barometer, dry and wet bulb thermometers, gridiron thermometer, and Daniell's and Regnault's hygrometers, which comprised all the instruments usually taken up in these low ascents. In the first low ascent, July 30, this framework was fixed inside the car; but as it seemed possible that the warmth proceeding from the voyagers might influence the readings of the instruments, it was always afterwards fixed outside, and projected beyond the car, so that all the instruments were freely exposed to the surrounding air. The ascent on August 20 was a low one, and presented no remarkable feature except that the balloon was nearly becalmed over London. The earth was left at 6.26 p.m., and the air was so quiet that at the height of three-quarters of a mile the balloon was still over the Crystal Palace. At 7h. 47m. it was over London, and moving so slowly that it was thought desirable to ascend above the clouds in hopes of meeting with a more rapid current of air. At 8h. 5m. the voyagers were above the clouds, and it became quite light again, darkness having come on whilst hovering over London, at which time the gradual illumination by the lights in the streets formed a most wonderful sight, and one never to be forgotten. The roar, or rather loud hum, proceeding from the great city was also most remarkable. After having been above the clouds some time, the lowing of cattle and other agricultural sounds were heard. Accordingly, the valve-line was pulled, and the balloon descended below the clouds, when the light of London was seen in the distance as a misty glare. The darkness increased as the balloon descended very slowly, and it at length touched the ground so gently in the middle of a field at Mill Hill, near Hendon, that those in the car were scarcely aware of the contact. There were twelve voyagers altogether, and when with some trouble sufficient countrymen were collected to take their places and enable

Ascent from Crystal Palace, August 20, and from Hendon, August 21, 1862.

<sup>1</sup> This was a thermometer with a bulb shaped like a gridiron, so as to have a very great surface exposed to the air. It was thought that the ordinary pea-sized bulb would not permit of the thermometer being sufficiently delicate to register the rapid changes of temperature due to the quick motion of the balloon, as it requires some little time for such a thermometer to take up the temperature of the surrounding medium.



them to leave the car, it was resolved to anchor the balloon for the night and to make an ascent in the early morning. Accordingly, at 4.30 A.M., on August 21, the earth was left, there being altogether five persons in the car. It was a dull, warm, cloudy morning, with the sky overcast. In about an hour the height of 3 miles was attained, and the temperature had fallen to 23°, having been 58° on the earth before leaving. The aspect of the clouds under formation before and during the rising of the sun was marvellous in the extreme, and baffled description. There were seen shining masses of cloud in mountain chains, rising perpendicularly from the plain, with summits of dazzling whiteness, forming vast ravines, down which the balloon appeared to glide, or pass through their sides, into other valleys, until, as the balloon rose far above, all appeared a mighty sea of white cloud. The descent was effected about a quarter past seven, and the transition from the magnificent scene above the clouds to the ugly prospect of the dreary earth as seen early on a dull morning, with a uniform leaden sky, was most depressing. The place of descent was near Biggleswade.

The most noteworthy fact in connection with the ascent, September 1, 1862, was, that from the balloon the clouds were observed to be forming below, and seen to be following the whole course of the Thames from the Nore to Richmond. The clouds were above the river following all its windings, and extending neither to the right nor to the left. It was about the time of high water at London Bridge, and the phenomenon was no doubt connected with the warm water from the sea.

As in the ascent, September 5, 1862, the greatest height ever reached was attained, it is desirable to give the account of it in some detail, and in Mr Glaisher's own words. It is only necessary to premise that it was intended on this occasion to ascend as high as possible. The following is an extract from Mr Glaisher's account (*British Association Report*, 1862 pp. 383-385):—

This ascent had been delayed owing to the unfavourable state of the weather. The balloon left at 1h. 5m. P.M. The temperature of the air was 59°, and the dew-point 50°. At the height of 1 mile it was 41°, dew-point 38°, and shortly afterwards we entered a cloud of about 1100 feet in thickness, in which the temperature of the air fell to 36°, the dew-point being the same, thus indicating that the air was here saturated with moisture. On emerging from the cloud at 1h. 17m. we came upon a flood of strong sunlight, with a beautiful blue sky, without a cloud above us, and a magnificent sea of cloud below, its surface being varied with endless hills, hillocks, mountain chains, and many snow-white masses rising from it. I here tried to take a view with the camera; but we were rising with too great rapidity, and going round and round too quickly, to enable me to do so. The flood of light, however, was so great that all I should have needed would have been a momentary exposure, as Dr Hill Norris had kindly furnished me with extremely sensitive dry plates for the purpose. We reached 2 miles in height at 1h. 21m. The temperature had fallen to the freezing-point, and the dew-point to 26°. We were 3 miles high at 1h. 28m., with a temperature of 18°, and dew-point 13°. At 1h. 30m. we had reached 4 miles, and the temperature was 8°, and dew-point -15°; in ten minutes more we had reached the fifth mile, and the temperature had passed below zero, and then read -2°, and at this point no dew was observed on Regnault's hygrometer when cooled down to -30°; but a dew-point obtained from the readings of dry and wet gave -36°. Up to this time I had taken observations with comfort. I had experienced no difficulty in breathing, whilst Mr Coxwell, in consequence of the necessary exertions he had to make, had breathed with difficulty for some time. At 1h. 51m. the barometer reading was 11.06 inches, but this requires a subtractive correction of 0.25 inch, as found by comparison with Lord Wrottesley's standard barometer just before starting. I afterwards read the dry thermometer as -5°; this must have been about 1h. 52m. or later; I could not see the column of mercury in the wet bulb thermometer; nor afterwards the hands of the watch, nor the fine divisions on any instrument. I asked Mr Coxwell to help me to read the instruments, as I experienced a difficulty in seeing. In consequence, however, of the rotatory motion of the balloon, which had continued without ceasing since the earth had been left, the valve-line had become twisted, and he had to leave the car and mount into the

ring above to adjust it. At this time I looked at the barometer, and found it to be 10 inches, still decreasing fast; its true reading therefore was 9½ inches, implying a height of 29,000 feet. Shortly afterwards I laid my arm upon the table, possessed of its full vigour, and on being desirous of using it, I found it powerless—it must have lost its power momentarily. I tried to move the other arm, and found it powerless also. I then tried to shake myself, and succeeded in shaking my body. I seemed to have no limbs. I then looked at the barometer, and whilst doing so my head fell on my shoulder. I struggled and shook my body again, but could not move my arms. I got my head upright, but for an instant only, when it fell on my right shoulder, and then I fell backwards, my back resting against the side of the car, and my head on its edge; in this position my eyes were directed towards Mr Coxwell in the ring. When I shook my body I seemed to have full power over the muscles of the back, and considerable power over those of the neck, but none over either my arms or my legs; in fact, I seemed to have none. As in the case of the arms, all muscular power was lost in an instant from my back and neck. I dimly saw Mr Coxwell in the ring, and endeavoured to speak, but could not; when in an instant intense black darkness came; the optic nerve finally lost power suddenly. I was still conscious, with as active a brain as at the present moment whilst writing this. I thought I had been seized with asphyxia, and that I should experience no more, as death would come unless we speedily descended: other thoughts were actively entering my mind, when I suddenly became unconscious as on going to sleep. I cannot tell anything of the sense of hearing, the perfect stillness and silence of the regions 6 miles from the earth (and at this time we were between 6 and 7 miles high) is such that no sound reaches the ear.

My last observation was made at 1h. 54m. at 29,000 feet. I suppose two or three minutes fully were occupied between my eyes becoming insensible to seeing fine divisions and 1h. 54m., and then that two or three minutes more passed till I was insensible; therefore I think this took place at about 1h. 56m. or 1h. 57m. Whilst powerless I heard the words 'temperature' and 'observation,' and I knew Mr Coxwell was in the car speaking to me, and endeavouring to arouse me; therefore consciousness and hearing had returned. I then heard him speak more emphatically, but I could not see, speak, or move. I heard him again say, 'Do try—now do.' Then I saw the instruments dimly, then Mr Coxwell, and very shortly saw clearly. I rose in my seat and looked round, as though waking from sleep, though not refreshed by sleep, and said to Mr Coxwell, 'I have been insensible.' He said, 'You have; and I too, very nearly.' I then drew up my legs, which had been extended before me, and took a pencil in my hand to begin observations. Mr Coxwell told me that he had lost the use of his hands, which were black, and I poured brandy over them.

I resumed my observations at 2h. 7m., recording the barometer reading at 11.53 inches and temperature -2°. I suppose that three or four minutes were occupied from the time of my hearing the words 'temperature' and 'observation' till I began to observe. If so, then returning consciousness came at 2h. 4m., and this gives seven minutes for total insensibility. I found the water in the vessel supplying the wet bulb thermometer, which I had by frequent disturbances kept from freezing, was one solid mass of ice; and it did not all melt until after we had been on the ground some time.

"Mr Coxwell told me that whilst in the ring he felt it piercingly cold; that hear-frost was all round the neck of the balloon; on attempting to leave the ring he found his hands frozen, and he had to place his arms on the ring and drop down; that he thought for a moment I had lain back to rest myself; that he spoke to me without eliciting a reply; that he then noticed my legs projected and my arms hung down by my side; that my countenance was serene and placid, without the earnestness and anxiety he had noticed before going into the ring, and then it struck him I was insensible. He wished to approach me, but could not, and he felt insensibility coming over himself; that he became anxious to open the valve, but in consequence of his having lost the use of his hands he could not, and ultimately did so by seizing the cord with his teeth, and dipping his head two or three times, until the balloon took a decided turn downwards.

"No inconvenience followed this insensibility, and when we dropped it was in a country where no conveyance of any kind could be obtained, so that I had to walk between 7 and 8 miles.

"The descent was at first very rapid; we passed downwards 3 miles in nine minutes; the balloon's career was then checked, and it finally descended in the centre of a large grass field at Cold Weston, 7½ miles from Ludlow.

"In this ascent six pigeons were taken up. One was thrown out at the height of 3 miles, when it extended its wings and dropped as a piece of paper; a second, at 4 miles, fell vigorously round and round, apparently taking a dip each time; a third was thrown out between 4 and 5 miles, and it fell downwards as a stone; a fourth was thrown out at 4 miles on descending; it flew in a circle, and shortly alighted on the top of the balloon. The two remaining

Ascent  
from the  
Crystal  
Palace on  
September  
1, 1862.

Ascent  
from Wol-  
verhampton  
on Sep-  
tember 5,  
1862.  
The great-  
est height  
ever  
reached

pigeons were brought down to the ground. One was found to be dead, and the other, a carrier, was still living, but would not leave the hand when I attempted to throw it off, till, after a quarter of an hour, it began to peck a piece of ribbon which encircled its neck, and was then jerked off the finger, and flew with some vigour towards Wolverhampton. One of the pigeons returned to Wolverhampton on Sunday, the 7th, and this is the only one that has been heard of."

Mr Glaisher found from his observation-cook that the last observation was made at 29,000 feet, and that at this time the balloon was ascending at the rate of 1000 feet per minute; and that when he resumed his observations, it was descending at the rate of 2000 feet per minute, the interval being thirteen minutes. This gives 36,000 or 37,000 feet for the greatest height attained. Two other series of considerations led to the latter height, and there can be no doubt that the altitude of 37,000 feet, or 7 miles, was attained on this occasion.

Ascent  
from the  
Crystal  
Palace on  
April 18  
1863.

In the ascent, April 18, 1863, 24,000 feet of elevation was reached. It was remarkable for the rapidity of the descent. At 2h. 44m., the balloon being then at a height of 10,000 feet, Mr Coxwell suddenly caught sight of Beachy Head, and Mr Glaisher, looking over the edge of the car, saw the sea, apparently immediately underneath. There was no time to be lost, and Mr Coxwell hung on to the valve-line, telling Mr Glaisher to leave his instruments and do the same. The earth was reached at 2h. 48m., the two miles of descent having been effected in four minutes. The balloon struck the ground near Newhaven with a terrible crash, but, from the free use of the valve-line, it was so crippled that it did not move afterwards. All the instruments, of the value of more than £25, including some that were unreplaceable, were broken, and Mr Glaisher was hurt. In the descent, after the first high ascent on July 17, 1862, the earth was struck with so much violence that most of the instruments were broken, and Mr Glaisher (who was closed in by his observing-board) was a good deal hurt then. In subsequent ascents, therefore, boxes were used filled with small mattresses, in which the instruments could be hurriedly placed, and the board was so arranged that it could be turned over and hung outside the car. These improvements had the effect of diminishing the danger to himself and the chance of breakage of the instruments, but in the Newhaven descent there was not sufficient time to put them in practice.

Ascent  
from Wol-  
verton,  
June 26,  
1863.

The circumstances met with in the ascent, June 26, 1863, were so remarkable that a short account cannot be omitted. The morning was at first very bright and fine, but between 11 and 12 o'clock a change took place; the sky became covered with clouds, and the wind rose and blew strongly, so that great difficulty was experienced in completing the inflation. At 1h. 3m. the balloon left; in four minutes, at 4000 feet high, cloud was entered. Mr Glaisher expected soon to break through it, and enter into bright sunshine as usual, but nothing of the sort took place, as, on emergence, clouds were seen both above and below. At 9000 feet the sighing and moaning of the wind were heard, and Mr Glaisher satisfied himself that this was due, not to the cordage of the balloon, but to opposing currents. At this time the sun was seen faintly, but instead of its brilliance increasing, although the balloon was then two miles high, a fog was entered, and the sight of the sun lost. The balloon next passed through a dry fog, which was left at 12,000 feet, and after the sun had been seen faintly for a little time, a wetting fog was entered.

"At 15,000 feet," Mr Glaisher proceeds, "we were still in fog, but it was not so wetting. At 16,000 feet we entered a dry fog; at 17,000 feet saw faint gleams of the sun, and heard a train. We were now about 3 miles high; at this time we were not in cloud, but clouds were below us; others were on our level at a distance, and yet more above us. We looked with astonishment at each other, and said as we were rising steadily we surely must soon

pass through them. At 17,500 feet we were again enveloped in fog, which became wetting at 18,500 feet; we left this cloud below at 19,600 feet. At 20,000 feet the sun was just visible. We were now approaching 4 miles high; dense clouds were still above us; for a space of 2000 to 3000 feet we met with no fog, but on passing above 4 miles our attention was first attracted to a dark mass of cloud, and then to another on our level; both these clouds had fringed edges—they were both nimbi. Without the slightest doubt both these clouds were regular rain-clouds. Whilst looking at them we again lost sight of everything, being enveloped in fog whilst passing upwards through 1000 feet. At 22,000 feet we again emerged, and were above clouds on passing above 23,000 feet. At six minutes to 2 o'clock we heard a railway train; the temperature here was 18°. I wished still to ascend to find the limits of this vapour, but Mr Coxwell said, 'We are too short of sand; I cannot go higher; we must not even stop here.' I was therefore most reluctantly compelled to abandon the wish, and looked searchingly around. At this highest point, in close proximity to us, were rain clouds; below us dense fog. I was again reminded that we must not stop. With a hasty glance everywhere, above, below, around, I saw the sky nearly covered with dark clouds of a stratus character, with cirri still higher, and small spaces of blue sky between them. The blue was not the blue of 4 or 5 miles high as I had always before seen it, but a faint blue, as seen from the earth when the air is charged with moisture."

In the downward journey an even more remarkable series of circumstances was met with; for a fall of rain was passed through, and then *below* it a snow-storm, the flakes being entirely composed of spiculae of ice and innumerable snow-crystals. On reaching the ground near Ely the lower atmosphere was found to be thick, misty, and murky. At Wolverton the afternoon was cold, raw, and disagreeable for a summer's day. The fact of rain-clouds extending layer above layer to a height of 4 miles, was one never hitherto regarded as possible; and the occurrence of rain and snow, and the latter underneath the former, and all happening on a day in the very middle of summer, formed a series of most curious and unexpected phenomena.

Mr Glaisher having, in one of his descents, which took Night place near sunset, observed that the temperature was the same through a very considerable height, it occurred to him that after dark it was quite possible that, for some elevation above the earth's surface, the temperature might even increase with increase of height; and to determine this he arranged for some ascents to be made after sunset, so that the temperature during the night might be observed. For this purpose he procured a couple of Davy lamps, which answered their object satisfactorily. Accordingly, on October 2, 1865, an ascent was made from Woolwich Arsenal, the time of starting being about three-quarters of an hour after the sun had set. The temperature on the earth was 56°, and it steadily increased to 59°·6 at the height of 1900 feet. This was established conclusively by repeated ups and downs, the temperature falling as the balloon descended. The view of London lighted up, as seen from the balloon in this ascent, the night being clear, was most wonderful. A second night ascent was made from the same place on December 2, 1865, and the balloon left the earth 2½ hours after sunset. On this occasion the temperature did not rise, but the decrease, though steady, was small. In an ascent from Windsor on May 29, 1866, the balloon was kept up till half-past eight o'clock, and the temperature was found to decrease as the earth was approached during the last 900 feet. In this last ascent no paid aeronaut was employed, as Mr Westcar, of the Royal Horse Guards, undertook the management of the balloon. In the preceding five ascents Mr Orton, of Blackwall, was employed as aeronaut.

It has been found necessary in the present notice to allude merely to the more striking points noticed in Mr Glaisher's twenty-eight ascents. The number of observations made by him was of course great, and it is only necessary here to repeat that they are to be found in the *Reports of the British Association for the Advancement of Science*,



1862-66. It appeared as one of the results of the experiments that the rate of the decline of temperature with elevation near the earth was very different when the sky was clear from what was the case when it was cloudy; and the equality of temperature at sunset and increase with height after sunset were very remarkable facts which were not anticipated, and which have an important bearing on the theory of refraction, as astronomical observations are usually made at night. Even at the height of 5 miles, cirrus clouds were seen high in the air, apparently as far above as they seem when viewed from the earth, and the air must there be so exceedingly dry that it is hard to believe that their presence can be due to moisture at all. The results of the observations differed very much, and no doubt the atmospheric conditions depended not only on the time of day, but also on the season of the year, and were such that a vast number of ascents would be requisite to determine the true laws with anything approaching to certainty and completeness. It is also clear that England is a most unfit country for the pursuit of such investigations, as from whatever place the balloon started, it was never safe to be more than an hour above the clouds for fear of reaching the sea. It appeared from the observations that an aneroid barometer could be trusted to read as accurately as a mercurial barometer to the heights reached. The time of vibration of a horizontal magnet was taken in very many of the ascents, and the results of ten different sets of observations proved undoubtedly that the time of vibration was longer than on the earth. In almost all the ascents the balloon was under the influence of currents of air in different directions. The thickness of these currents was found to vary greatly. The direction of the wind on the earth was sometimes that of the whole mass of air up to 20,000 feet, whilst at other times the direction changed within 500 feet of the earth. Sometimes directly opposite currents were met with at different heights in the same ascent, and three or four streams of air were encountered moving in different directions. Ignoring the different currents of air which caused the balloon to change its direction, and at times to move in entirely opposite directions, and simply taking into account the places of ascent and descent, the distances so measured were always very much greater than the horizontal movement of the air as measured by anemometers. For example, on January 12, 1862, the balloon left Woolwich at 2h. 8m. P.M., and descended at Lakenheath, 70 miles distant from the place of ascent, at 4h. 19m. P.M. At the Greenwich Observatory, by Robinson's anemometer, during this time the motion of the air was 6 miles only. With regard to physiological observations, Mr Glaisher found that the number of pulsations increased with elevation, as also the number of inspirations. The number of his pulsations was generally 76 per minute before starting, about 90 at 10,000 feet, 100 at 20,000 feet, and 110 at higher elevations. But a good deal depended on the temperament of the individual. This was also the case in respect to colour; at 10,000 feet the faces of some would be a glowing purple, whilst others would be scarcely affected; at 4 miles high Mr Glaisher found the pulsations of his heart distinctly audible, and his breathing was very much affected, so that panting was produced by the very slightest exertion; at 29,000 feet he became insensible. In reference to the propagation of sound, it was at all times found that sounds from the earth were more or less audible according to the amount of moisture in the air. When in clouds at 4 miles high, a railway train was heard; but when clouds were far below, no sound ever reached the ear at this elevation. The discharge of a gun was heard at 10,000 feet. The barking of a dog was heard at the height of 2 miles, while the shouting of a multitude of people was not audible at heights exceeding 4000 feet.

The majority of Mr Glaisher's experiments were made in the summer, partly because public ascents took place at this time of the year, and partly because the weather was more settled. But some special ascents were made in the winter; these were found to be very troublesome and costly, owing to the time that was wasted before a suitable day occurred, and to the boisterous weather, which damaged the balloon. Altogether the number of ascents bore but a small ratio to the number of days spent over them. Sometimes it was necessary to wait at Wolverhampton a whole week after the day fixed for the ascent, owing to the unfavourable state of the weather and the necessity of keeping the light gas required for the balloon in a separate gasometer (as the lightest gas is the worst in illuminating power), added to the cost and difficulty. When balloons ascend as public exhibitions from places of entertainment it is very rarely that a height of a mile is reached, although, in the absence of instruments, it is not unusual for the aeronaut to exaggerate the elevation, as the passengers have no reason for disputing what is told them. This must be borne in mind when physiological or other phenomena are described by voyagers unprovided with instruments. We have noticed the observations made in Mr Glaisher's ascents at greater length, because they are almost the only ones that have been made in which the height and other matters are determined with certainty. A quantity of air was collected in two large bags at the height of 12,000 feet in the ascent on January 12, 1864, and submitted to Professor Tyndall, but he has never made public the analysis of it.

In the years 1867 and 1868 M. Flammarion made eight or nine ascents from Paris for scientific purposes. The heights reached were not great, but the general result of the observations was to confirm those made by Mr Glaisher. See M. Flammarion in *Voyages Aériens*, Paris, 1870, or *Travels in the Air*, London, 1871. Observations were also made in some balloon ascents by M. de Fonvielle, which are noticed in the works just referred to.

The balloon had not been discovered very long before it received a military status, and soon after the commencement of the French revolutionary war an aeronautic school was founded at Meudon; Guyton de Morveau, the chemist, and Colonel Coutelle being the persons in charge. Four balloons were constructed for the armies of the north, of the Sambre and Meuse, of the Rhine and Moselle, and of Egypt. In June 1794 Coutelle ascended with the adjutant and general to reconnoitre the hostile army just before the battle of Fleurus, and two reconnaissances were made, each occupying four hours. It is generally stated that it was to the information so gained that the French victory was due. The balloon corps was in constant requisition during the campaign, but it does not appear that, with the exception of the reconnaissances just mentioned, any great advantages resulted, except in a moral point of view. But even this was of importance, as the enemy were much disconcerted at having their movements so completely watched, while the French were correspondingly elated at the superior information it was believed they were gaining. A 1 attempt was made to revive the use of balloons in the African campaign of 1830, but no opportunity occurred in which they could be employed. It is said that in 1849 a reconnoitring balloon was sent up from before Venice, and that the Russians used one at Sebastopol. In the French campaign against Italy in 1859 the French had recourse to the use of balloons, but this time there was not any aerostatic corps, and their management was entrusted to the brothers Godard. Several reconnaissances were made, and one of especial interest the day before the battle of Solferino. No information of much importance seems, however, to have been gained thereby. The Fleurus re-

Ascents of  
M. Flammarion,  
1867-68.

Use of bal-  
loons for  
military  
purposes.

Reconnaissance be-  
fore the  
battle of  
Fleurus.

At Sol-  
ferino.

connaissance was made in a balloon inflated with hydrogen gas, while at Solferino a fire-balloon was employed. Each system has its advantages and disadvantages; the gas-balloon requires several hours for inflation, but then it can remain in the air any length of time; the fire-balloon can be inflated rapidly, but it will not stay in the air more than five or ten minutes unless a furnace is taken up, the use of which is impracticable in even a moderate wind; besides, the fire-balloon must be of very large dimensions, and only one person could, as a rule, ascend at a time, and he would have to be occupied with the fire: the use of fire-balloons also is always attended with some danger. M. Eugene Godard, who was engaged in the management of the balloons in the Italian campaign, wrote to the *Times*, in August 1864, expressing his opinion of the superiority of fire-balloons for war purposes, as they are so easily inflated and are not destroyed or compelled to descend even if pierced by several balls; and this was also, we believe, the opinion of the Austrians who made experiments with war balloons.

Balloons  
used in the  
American  
war.

In the late American war balloons were a good deal used by the Federals. There was a regular balloon staff attached to McClellan's army, with a captain, an assistant-captain, and about 50 non-commissioned officers and privates. The apparatus consisted of two generators, drawn by four horses each; two balloons, drawn by four horses each, and an acid-cart, drawn by two horses. The two balloons used contained about 13,000 and 26,000 feet of gas, and the inflation usually occupied about three hours. (See Captain Beaumont's Account, vol. xii. of the *Royal Engineers' Papers*.) We are not aware of the value set by the officers in command on the information obtained by this means; but as we believe balloons were employed till the conclusion of the war, it is clear that some importance was attached to their use. In 1862 or 1863 one or two experiments to test the use of balloons in making reconnaissances were made at Aldershot, but nothing came of them.

When the Montgolfiers first discovered the balloon, its great use in military operations was at once prophesied; but these anticipations have not been realised. On the other hand, however, there can be no doubt that the balloon has never had a fair trial, being viewed coldly by officers enamoured of routine, and when used, being often left unsupplied with suitable appointments. It is probable that a future still remains for the balloon in this direction.

Use of bal-  
loons in the  
siege of  
Paris,  
1870-71.

The paramount value of the balloon during the recent siege of Paris must be fresh in the minds of all. It was by it alone that communication was kept up between the besieged city and the external world, as the balloons carried away from Paris the pigeons which afterwards brought back to it the news of the provinces. The total number of balloons that ascended from Paris during the siege, conveying persons and despatches, was sixty-four—the first having started on September 23, 1870, and the last on January 28, 1871. Gambetta effected his escape from Paris, on October 7, in the balloon *Armand-Barbes*, an event which doubtless led to the prolongation of the war. Of the sixty-four balloons only two were never heard of; they were blown out to sea. One of the most remarkable voyages was that of the *Ville d'Orléans*, which, leaving Paris at eleven o'clock on November 21, descended fifteen hours afterwards near Christiania, having crossed the North Sea. Several of the balloons on their descent were taken by the Prussians, and a good many were fired at while in the air; but we do not hear of any being injured from this cause. The average size of the balloons was from 2000 to 2050 metres, or from 70,000 to 72,000 cubic feet. The above facts we have extracted from *Les Ballons du Siège de Paris*, a sheet published by Bulla & Sons, Paris; compiled by the brothers Tissandier, well-known French aeronauts, and giving the

name, size, and times of ascent and descent of every balloon that left Paris, with the names of the aeronaut and generally also those of the passengers, the weight of despatches, the number of pigeons, &c. Only those balloons, however, are noticed, in which some person ascended. A similar list of sixty-two balloons is given by Mr Glaisher in the introduction to the second edition of *Travels in the Air* (1871). It was, however, published too soon after the conclusion of the siege to be quite so complete as the sheet of the MM. Tissandier.

It is perhaps worth stating that the balloons were manufactured and despatched (generally from the platforms of the Orleans or the Northern Railway) under the direction of the Post-Office. The aeronauts employed were mostly sailors, who did their work very well. No use whatever was made in the war of balloons for purposes of reconnaissance. The exceedingly important part played by the balloon in the siege of Paris would alone, if it had been of no other utility, render it one of the most valuable inventions of the last century.

The principle of the parachute is so simple that the idea *Parachute* must have occurred to persons in all ages. Father Loubere, *chute* in his History of Siam, published two centuries ago, tells of a person who frequently diverted the court by the prodigious leaps he used to take, having two parachutes or umbrellas fastened to his girdle. In 1783 a certain M. le Normand practically demonstrated the efficiency of a parachute by descending from a high house at Lyons; but he merely regarded it as a useful means whereby to escape from fire. To Blanchard is due the idea of using it as an *Blanchard*, adjunct to the balloon. As early as 1785 he had constructed a parachute, to which was attached a basket. In this he placed a dog, which descended safely to the ground when the parachute was released from a balloon at a considerable elevation. It is stated that he descended himself from a balloon in a parachute in 1793; but, owing to some defect in its construction, he fell too rapidly, and broke his leg.

André Jaques Garnerin was the first person who successfully descended from a balloon in a parachute, and he repeated this experiment so often that he may be said to have first demonstrated the practicability of using the machine; and, in fact, that he invented it in a practical and suitable form. In 1793 Garnerin had been taken prisoner at Marchiennes, and he was confined for between two and three years in the fortress of Bude, in Hungary. While in captivity he elaborated in his mind the means of descending from a balloon by means of a parachute; and on October 22, 1797, he made his first public experiment. He ascended from the park of Monceau at Paris, and when at the height of about  $1\frac{1}{2}$  mile he released the parachute, which was attached to the balloon in place of a car; the balloon, relieved suddenly of so great a weight, rose very rapidly till it burst, while the parachute descended very fast, making violent oscillations all the way. Garnerin, however, reached the earth in safety upon the plain of Monceau. In 1802 Garnerin came to England and made a good many ascents in all parts of the country, many of which excited much enthusiasm, as can be seen from the contemporary accounts; and on September 21, 1802, he repeated his parachute experiment in England.

The parachute was dome-shaped, and bore a resemblance to a large umbrella. The case or dome was made of white canvas, and was 23 feet in diameter. At the top was a truck or round piece of wood 10 inches in diameter, with a hole in its centre, fastened to the canvas by 32 short pieces of tape. The parachute was suspended from a hoop attached to the netting of the balloon, and below the parachute was placed a cylindrical basket, 4 feet high and 2½ feet in diameter, which contained the aeronaut. The ascent took place at about six o'clock from North Audley Street, London;

Garnerin,

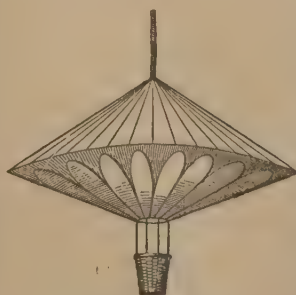
Garnerin descends in a parachute in England. See Plate I.



and, at a height of about (it is believed) 8000 feet, Garnerin separated the parachute from the balloon. For a few seconds his fate seemed certain, as the parachute retained the collapsed state in which it had originally ascended, and fell very rapidly. It suddenly, however, expanded, and the rapidity of its descent was at once checked, but the oscillations were so violent that the car, which was suspended 20 feet below, was sometimes on a level with the rest of the apparatus. Some accounts state that these oscillations increased, others that they decreased as the parachute descended, and the latter seems most probable. It came to the ground in a field at the back of St Pancras Church, the descent having occupied rather more than ten minutes. Garnerin was hurt a little by the violence with which the basket containing him struck the earth; but a few cuts and a slight nausea represented all the ill effects of his fall. He made, certainly, one other descent in a similar way (as that just described is stated to have been his third), and we believe several others on the Continent, but this was the only one he effected in England.

Jordaki Kuparento, a Polish aeronaut, is the only person who ever made any real use of a parachute. He ascended from Warsaw on July 24, 1808, in a fire-balloon, which, at a considerable elevation, took fire; but being provided with a parachute, he was enabled to effect his descent in safety.

The next experiment made with a parachute was that which resulted in the unfortunate death of Mr Robert Cocking. So early as 1814 this gentleman had lectured on the subject before the City Philosophical Society, and also before the Society of Arts. He always retained an interest in ballooning, and made two ascents—one with Mr Sadler, and the other on September 27, 1836, with Mr Green. The success of the balloon trip of Messrs Holland, Mason, and Green, seems to have incited Mr Cocking to demonstrate practically the truth of his views. He accordingly constructed a suitable parachute on his principles, and having succeeded in obtaining the consent of Messrs Hughes and Gye, the proprietors of Vauxhall Gardens, to permit the ascent to be made there, he prevailed on Mr Green to ascend in his great Nassau balloon with the parachute attached. The great defect of Garnerin's umbrella-shaped parachute was its violent oscillation during descent, and Mr Cocking considered that if the parachute were made of a conical form (vertex downwards), the whole of this oscillation would be avoided; and if it were made of sufficient size, there would be resistance enough to



Cocking's Parachute.

check too rapid a descent. He therefore constructed a parachute on this principle, the radius of which at its widest part was about 17 feet. It was stated in the public announcements previous to the experiment that the whole weighed 223 lb; but from the evidence at the inquest it appeared that the weight must have been over 400 lb. Mr Cocking's weight was 177 lb, which was so much additional. On July 24, 1837, the trial took place; and the Nassau balloon, with Mr Green and Mr Spencer, a solicitor, in the car, and having suspended below it the parachute, in the car of which was Mr Cocking, rose from the ground at twenty-five minutes to eight in the evening. A good deal of difficulty was experienced in

rising to a suitable height, partly in consequence of the resistance to the air offered by the expanded parachute, and partly owing to its weight. Mr Cocking wished the height to be 8000 feet; but when the balloon reached the height of 5000 feet, it being then nearly over Greenwich, Mr Green called out to Mr Cocking that he should be unable to ascend to the requisite height if the parachute was to descend in daylight. Mr Cocking accordingly let slip the catch which was to liberate him from the balloon. The parachute for a few seconds descended very rapidly but still evenly, until suddenly the upper rim seemed to give way, and the whole apparatus collapsed (taking a form resembling an umbrella turned inside out, and nearly closed), and the machine descended with great rapidity, oscillating very much. When about two or three hundred feet from the ground, the basket became disengaged from the remnant of the parachute, and Mr Cocking was found in a field at Lee, literally dashed to pieces.

Mr Green and Mr Spencer, who were in the car of the balloon, had also a narrow escape. At the moment the parachute was disengaged they crouched down in the car, and Mr Green clung to the valve-line, to permit the escape of the gas. The balloon shot upwards, plunging and rolling, and the gas pouring from both the upper and lower valves, but chiefly from the latter, as the great resistance of the air checked its egress from the former. Mr Green and Mr Spencer applied their mouths to tubes communicating with an air-bag with which they had had the foresight to provide themselves, otherwise they would certainly have been suffocated by the gas. Notwithstanding this precaution, however, the gas almost totally deprived them of sight for four or five minutes. When they came to themselves they found they were at a height of about four miles, and descending rapidly. They effected, however, a safe descent near Maidstone.

Many objections were made, after the result, to the form of Mr Cocking's parachute; but there is little doubt that had it been constructed of sufficient strength, and perhaps of somewhat larger size, it would have answered its purpose. As it was, the upper rim was made of tin, which soon gave way. Mr Wise, the American aeronaut, made some experiments on parachutes of both forms (Garnerin's and Cocking's), and found that the latter always were much more steady, descending generally in a spiral curve.

In 1839 Mr Hampton made three descents in a parachute, on Garnerin's pattern, from his balloon, the "Albion." He followed Garnerin's example in attaching the parachute to the netting of the balloon, so that when the connection between the two was severed the latter was left to its own devices. Mr Hampton took measures, however, that it should descend soon after the parachute, and it was generally found no great distance off, and returned to him. All his parachute descents were safely performed, although in one he was a good deal shaken.

We may remark that a descending balloon half-full of gas either does rise, or can with a little management be made to rise, to the top of the netting and take the form of a parachute, thus materially lessening the rapidity of descent. Mr Wise, in fact, having noticed this, once purposely exploded his balloon when at a considerable altitude, and



Hampton's Parachute.

Mr Hampton's parachute descents.

Descending balloon takes the parachute form.

the resistance offered to the air by the envelope of the balloon was sufficient to enable him to reach the ground without injury. And a similar thing took place in one of Mr Glaisher's high scientific ascents (April 18, 1863), when, at a height of about 2 miles, the sea appeared directly underneath; the gas was let out of the balloon as quickly as possible, and the velocity of descent was so great, that the 2 miles of vertical height were passed through in four minutes. On the balloon reaching the ground at Newhaven, close to the shore, it was found to be nearly empty. The balloon had, in fact, for the last mile or more, merely acted as a parachute; the shock was a severe one, and all the instruments were broken, but nothing serious resulted to the occupants of the car.

Numerous attempts have been made both to direct balloons and contrive independent flying machines. After the invention of the balloon by the brothers Montgolfier, it was at once thought that no very great difficulty would be found in devising a suitable steering apparatus; in fact, it was supposed that to rise into the air and remain there was the chief difficulty, and that, this being accomplished, the power of directing the aerostat would be a secondary achievement that must follow before long. Accordingly, in most of the early balloons the voyagers took up oars, sails, or paddles, which they diligently worked while in the air; sometimes they thought an effect was produced, and sometimes not. If we consider the number of different currents in the atmosphere, it is no wonder that some should have announced with confidence that their course was changed from that of the wind by means of the sails or oars that they used; in fact, it is not very often that the whole atmosphere up to a considerable height is moving *en masse* in the same direction, so that generally the course taken by the balloon, as determined merely by joining the places of ascent and descent, is not identical with the direction of the wind, even when it is the same at both places. Although there is no reason why balloons should not be so guided by means of mechanical appliances attached to them as to move in a direction making a small angle with that of the wind, still it must have been evident to any one who has observed a balloon during inflation on a windy day, that any motion in which it would be exposed to the action of a strong current of air must result in its destruction. It has therefore gradually become recognised that the balloon is scarcely a step at all towards a system of aerial navigation; and many have thought that the principles involved in the construction of a flying machine must be very different from the simple statical equilibrium that subsists when a balloon is floating in the air. "To navigate the air the machine must be heavier than the air," has frequently been regarded as an axiom; and there can be no doubt that an apparatus constructed of such light material as is necessary for a balloon must either be destroyed or become ungovernable in a high wind. Recently, however, M. Dupuy de Lôme, an eminent French engineer, has constructed and made experiments with a balloon which he considers satisfies some of the conditions. The balloon is spindle-shaped, the longer axis being horizontal, and it contains about 120,000 cubic feet. The car is suspended below the middle of the balloon, and there are provided a rudder and a screw. The rudder consists of a triangular sail placed beneath the balloon and near the rear, and is kept in position by a horizontal yard, about 20 feet long, turning round a pivot in its forward extremity; the height of the sail is 16 feet, and its surface 160 square feet. Two ropes for working the rudder extend forward to the seat of the steerer, who has before him a compass fixed to the car, the central part of which will contain fourteen men. The screw is carried by the car, and is driven by four or eight men working at a capstan. A trial was made with the

machine on February 2, 1872, on a windy day, and M. de Lôme considered that he had been enabled by his screw and rudder to alter his course about 12°. (See *Report of the Aeronautical Society*, 1872).

Whatever difficulties may present themselves in regulating the horizontal movement of the balloon, there can be no doubt that the vertical motion could be obtained by means of a screw or other mechanical means; and the power of being able to ascend or descend without loss of ballast would be a considerable gain. In the opinion of many, however, the balloon is not worth improvement; and as ballooning is now generally practised merely as a spectacle by which the aeronaut or showman gains his living, it is not likely that any advancement will be made.

Of flying machines, in which both buoyancy and motion were proposed to be obtained by purely mechanical means, the number has been very great. Most of the projects have been chimerical, and were due to persons possessed of an insufficient knowledge of the principles of natural philosophy, both theoretically and practically. They serve, however, to show how great a number of individuals must have paid attention to the matter, and even at the present time several patents are taken out annually on the subject. We do not propose here to give an account of any of these projects, for but few have ever passed beyond projects, but will merely refer to Mr Henson's aerial carriage, which in 1843 attracted some attention. The apparatus was an elaborate one, and its principal feature was the great expanse of the sustaining planes. The machine was to advance with its front edge a little raised, the effect of which would be to present its under surface to the air over which it was passing; the resistance of this air, acting on it like the strong wind on the sails of a windmill, would, it was thought, prevent the descent of the machine. Mr Henson invented a steam-engine of great lightness, but he proposed that the machine should be started down an inclined plane, so that the steam-engine would only have to make up for the velocity lost by the resistance of the air. The scheme never came to anything.

In the still air of a room it is, of course, not difficult to attach an apparatus to a balloon so as to direct its motion, and even models of flying machines have been made which, when tried in a room, seemed moderately successful. Some instruments which would very nearly support themselves in the air were shown at the Aeronautical Society's exhibition at the Crystal Palace. A good deal would be accomplished if an accurate knowledge of the exact motion of a bird's wing could be obtained; in fact, until this is known, or until sufficient experiments on the resistance experienced by different-shaped laminae with different motions are made, there seems little chance of the construction of a satisfactory flying machine, unless means can be found to make a steam-engine of much less weight than is at present necessary.

In 1865 the Aeronautical Society of Great Britain was founded, the officers being—President, the Duke of Argyll; Treasurer, Mr J. Glaisher; and Secretary, Mr Brearey. It has published an annual report every year since [1873], containing selections from the papers read to the society, and abstracts of the discussions that took place thereon at the meetings. The numerous papers submitted to this society bear witness to the great number of minds that are engaged on the solution of the problem of aerial navigation. Of course, not a few of the methods proposed are the fanciful projects of ignorant men, but some show the careful thought and elaborate experiment of trained engineers and other qualified persons. In 1868 the society held an exhibition of flying machines, &c., at the Crystal Palace, which was visited by many persons. A fire-balloon of a M. de la Marne, which should have ascended during this exhibition,

Flying  
machine  
and navi-  
gable bal-  
loons.

Henson's  
aerial car-  
riage.

Aeronauti-  
cal Society  
of Great  
Britain.



caught fire and was burnt. In 1871 a series of experiments was made at Penn's factory (Greenwich) on the resistance of different shaped planes placed at different angles, in a current of air produced by a rotary fan. Investigations of this kind not only form the first step towards obtaining data for a true knowledge of the exact nature of flying, but are also independently of high scientific interest. The chief object of the society is to bring together those persons who are interested in the subject of aeronautics (except balloonists by trade, who are ineligible), and to encourage those who, possessing suitable acquirements, are devoting their time to the investigation of the question.

Aerostatic societies have also been founded in other countries; but although they have been inaugurated with considerable éclat, more than one have already terminated a short-lived career. The Vienna society seems, however, to have been unusually active during the recent exhibition of 1873.

Theory of the equilibrium of the balloon.

The principle in virtue of which a balloon ascends is exactly the same as that which causes a piece of wood or other material to float partially immersed in water, and may be stated as follows, viz., that if any body float in equilibrium in a fluid, the weight of the body is equal to the weight of the fluid displaced. By the "fluid displaced" is meant the fluid which would occupy the space actually occupied in the fluid by the body if the body were removed. When the fluid is inelastic and incompressible, i.e., a liquid, as water, its density is the same throughout, and bodies placed in it either rise to the surface and float there partially immersed, or sink to the bottom. Thus, suppose a body only one-third as heavy as water (in other words, whose specific gravity is one-third) was floating on the surface of water, then, as the weight of the body must be equal to that of the water it displaces, it is clear that one-third of the body must be immersed. In the case, however, of an elastic or gaseous fluid, such as air, the density gradually decreases as we recede from the surface of the earth, for each layer has to support the weight of all above it, and as air is elastic or compressible, the layers near the earth are more pressed upon, and therefore denser than those above. Thus, if a body lighter than the air it displaces be set free in the atmosphere, it rises to such a height that the air there is so attenuated that the weight of it displaced is equal to that of the body, when equilibrium takes place, and the body ascends no higher. In all cases, therefore, a body floating in the air is totally immersed, and it can never get beyond the atmosphere, and float, as it were, upon its surface.

To find, therefore, how high any body (lighter than the air it displaces), such as a balloon, of given capacity and weight, will rise, it is only necessary to calculate at what height the volume of a quantity of air equal to the given capacity will be equal in weight to the given weight. Leaving temperature out of the question, the law of the decrease of density in the atmosphere is such that the

density at a height  $x$  is equal to  $e^{-\frac{k}{g}x}$   $\times$  the density at the earth's surface,  $g$  being the measure of gravity, and  $k$  also a constant; the value of  $\frac{k}{g}$  is called the height of the homogeneous atmosphere, viz., it is equal to what would be the height of the atmosphere if it were homogeneous throughout, and of the same density as at the earth's surface. Its value may be taken at about 26,000 feet. Thus, let  $V$  be the volume of a balloon and its appurtenances, car, ropes, &c. (viz., the number of cubic feet, or whatever the unit of solidity may be, that it displaces), and let  $W$  be its weight (including that of the gas), then it will rise to a height  $x$  such that

$$W = Vg \times \text{density of air,}$$

$$= Vg\sigma_0 e^{-\frac{k}{g}x},$$

$g$  being the value of the force of gravity, and  $\sigma_0$  being the density of the air at the surface of the earth. This equation is not quite accurate, for several reasons—(1) because the decrease of temperature that results from increase of elevation has not been taken into account; (2) because  $g$  has been taken to measure the force of gravity on the earth's surface, whereas it should represent this force at a height  $x$ ; this is easily corrected by replacing  $g$  by  $g'$ ,

where  $g' = g \frac{a^2}{(a+x)^2}$ ,  $a$  being the radius of the earth, but as  $a$  is about 4000 miles, and  $x$  is never likely in any ordinary question to exceed 10 miles, we can replace  $g'$  by  $g$  without introducing sensible error, for the correction due to this cause would be much less than other uncertainties that must arise; and (3) because  $W$  and  $V$  could not both remain constant. If the balloon be not fully inflated on leaving, so that the gas contained in it can expand, then  $V$ , the volume of air displaced, will increase; while, if the balloon be full at starting, the envelope must either be strong enough to resist the increased pressure of the gas inside, due to the removal of some of the pressure outside (owing to the diminished density of the air), or some of the gas must be allowed to escape. The former alternative of the second case could not be complied with, as the balloon would burst; some of the gas must therefore escape, and so  $W$  is diminished. The weight of gas of which the balloon is thus eased cannot properly be omitted from the calculation, if  $x$  be considerable; but a good approximation is obtained without it, as the weight of the gas that escapes will generally bear a small proportion to the weight of balloon, car, grapnel, passengers, &c. The true equation (except as regards temperature) is therefore, for a balloon full at starting—

$$-W - \frac{g a^2 v_0 \rho_0 (1 - e^{-\frac{k}{g}x})}{(a+x)^2} = \frac{g a^2 V_0 \sigma_0 e^{-\frac{k}{g}x}}{(a+x)^2},$$

$v_0$  denoting the volume actually occupied by the gas,  $\sigma'$  denoting  $g \frac{a^2}{(a+x)^2}$ , viz., gravity at height  $x$ , and  $\rho_0$  being the density of the gas on the ground. It will generally be sufficient, especially when temperature is omitted, to take the formula in the approximate form written previously. As the volume of air displaced by the car, ropes, passengers, &c., is usually trifling compared to that displaced by the balloon itself, no great error can arise from taking  $v_0 = V_0$ . As an example, let us find how high a balloon of 100,000 cubic feet capacity would rise if inflated with pure hydrogen gas, carrying with it a weight of 3000 lb (this including the weight of the balloon itself and appurtenances). A cubic foot of air, at temperature 32° Fahr., and under a pressure of 29.922 in., weighs .080728 lb, and a cubic foot of hydrogen weighs .005592 lb, so that (supposing the barometer reading on the earth to be 29.922 in., and the temperature of the air to be 32°) at the surface of the earth the balloon, &c., weighs 3559 lb, and the weight of the air displaced is 8073 lb. The balloon will therefore approximately rise to such a height  $x$  that 100,000 cubic feet of air shall there weigh 3559 lb; and  $x$  is given in feet by the equation

$$e^{-\frac{x}{26000}} = \frac{3559}{8073},$$

or  $x = 26,000 (\log 8073 - \log 3559)$ , the logarithms being hyperbolic; if common or Briggian logarithms be used, the result must be multiplied by 2.30258... (the reciprocal of the modulus). In the above

case we find  $x$  = about 21,000 feet, and as at this height rather more than half the gas will have escaped (it having been supposed that the balloon was full at starting). This only reduces the value 3559 by about 300, and the result of taking it into account is only to increase the height just found by about 200 feet. If 2000 lb out of the 3000 were thrown away during the ascent, the balloon would reach a height of about 10 miles; the weight of the gas that escapes is here important, as, if it be not taken into account, the height given by the formula is only about 8 miles.

In actual aerostation, as at present practised, ordinary coal gas is used, which is many times heavier than hydrogen, being, in fact, usually not less than half the specific gravity of air. Even when balloons are inflated with hydrogen, generated by the action of sulphuric acid on zinc filings, the gas is very far from pure, and its density is often double that of pure hydrogen, and even greater.

The hydrostatic laws relating to the equilibrium of floating bodies were known long previous to the invention of the balloon in 1783, but it was only in the latter half of the 18th century that the nature of gases was sufficiently understood to enable these principles to have been acted on. As we have seen, both Black and Cavallo did make use of them on a small scale, and if they had thought it possible to make a varnish impervious to the passage of hydrogen gas they could have easily anticipated the Montgolfiers. As it was, no sooner was the fire-balloon invented, than Charles at once suggested and practically carried out the idea of the hydrogen or inflammable air balloon.

Mathematical theory of the motion of a balloon; the last problem that engaged the attention of Euler

The mathematical theory of the rate of ascent of a balloon possesses remarkable historic interest, from the fact that it was the last problem that engaged the attention of the greatest mathematician of the last century, Euler. The news of the experiment of the Montgolfiers at Annonay on June 5, 1783, reached the aged mathematician (he was in his 77th year) at St Petersburg, and with an energy that was characteristic of him he at once proceeded to investigate the motion of a globe lighter than the air it displaced. For many years he had been all but totally blind, and was in the habit of performing his calculations with chalk upon a black board. It was after his death, on September 7, 1783, that this board was found covered with the analytical investigation of the motion of an aerostat. This investigation is printed under the title, *Calculs sur les Ballons Aérostatiques faits par feu M. Léonard Euler, tels qu'on les a trouvés sur son ardoise, après sa mort arrivée le 7 Septembre 1783, in the Memoirs of the French Academy for 1781 (pp. 264-268). The explanation of the earlier date is that the volume of memoirs for 1781 was not published till 1784. The peculiarity of Euler's memoir is that it deals with the motion of a closed globe filled with a gas lighter than air, whereas the experiments of the Montgolfiers were made with balloons inflated with heated air. The explanation of this must be that either an imperfect account reached Euler, and that he supplied the details himself as seemed to him most probable, or that he, like the Montgolfiers themselves, attributed the rising of the balloon to the generation of a special gas given off by the chopped straw with which the fire was fed. The treatment of the question by Euler presents no particular point of importance—indeed, it could not; but the fact of its having given rise to the closing work of so long and distinguished a life, and having occupied the last thoughts of so great a mind, confers on the problem of the balloon's motion a peculiar interest.*

Now we proceed to the investigation of the vertical motion of a balloon inflated with gas, the horizontal motion, of course, being always equal to that of the current in

which it is placed. In supposing, therefore, the balloon to be ascending vertically into a perfectly calm atmosphere, there is no loss of generality. There are two cases of the problem, viz., when the balloon is only partially filled with gas at starting, and when it is quite filled. The motion in the former case we shall investigate first, as the balloon will ascend till it becomes completely full, and then the subsequent motion will belong to the second case. We may remark that it is usual in investigations relating to the motions of a balloon to regard it in the way that Euler did, viz., as a closed inextensible bag, capable of bearing any amount of pressure. In point of fact, the neck or lower orifice of the balloon is invariably open while it is in the air, so that the pressure inside and outside is practically always the same, and when the balloon continues ascending after it has become quite full, the gas pours out of the neck or is allowed to escape by opening the upper valve. It is to be noticed that we have not thought it necessary to transform the formulæ obtained in such wise that they may be readily adapted to numerical calculations as they stand, as our object is rather to exhibit the nature of the motion, and clearly express the conditions that are fulfilled in the case of a balloon, than deduce a series of formulæ for practical use. We shall, however, indicate the simplifications allowable in practical applications. The effect of temperature, though important, is neglected, as the connection between it and height is still unknown. It was chiefly to determine this relation that Mr Glaisher's ascents were undertaken, and at the conclusion of the first eight he deduced an empirical law which seemed to accord pretty well with the observations; the succeeding twenty ascents, however, failed to confirm this law. In fact, it is evident, even without observation, that the rate of the decline of temperature when the sky is clear must differ from what it is when cloudy, and that, being influenced to a great amount by radiation of heat from the earth's surface, it will vary from hour to hour. Under these circumstances, as our object is not to deduce a series of practical rules for calculating heights, &c., we have supposed the temperature to remain constant throughout the atmosphere. The assumption of any law of decrease would considerably complicate the equations. Perhaps the simplest law, mathematically considered, would be to assume the curve of descent of temperature to be  $y = e^{-ax}$ . The curve Mr Glaisher deduced from his eight ascents was a portion of a hyperbola, the constants being determined empirically.

Let  $M$  = the mass of the balloon, car, netting, gas, passengers, &c., on starting.

$V_0$  = the capacity of the envelope of the balloon when partially full.

$v_0$  = the volume of gas at the pressure of the air introduced into the balloon before starting.

$v$  = the volume (supposed less than  $V_0$ ) occupied by the gas at the height  $x$ .

$\rho_0$  = density of the gas in the balloon on the earth.

$\rho$  = density of the "air on the earth at the height  $x$ .

$\sigma$  = density of the "air on the earth.

$\sigma$  = " " at the height  $x$ .

$u$  = the initial upward velocity of the balloon (which is introduced for the sake of complete generality, but is always zero).

$u_x$  = the velocity (vertically upwards, as all horizontal motion is ignored) at height  $x$ .

The equation of motion at any time previous to the balloon becoming completely filled is

$$M \frac{du}{dt} = \sigma v g - M g - \lambda u^2 - \frac{1}{2} \sigma u^2,$$

the last term being due to the resistance of the air, which is assumed to vary directly as the square of the velocity and as the density of the air. In very slow motions the



resistance appears from experiments to vary pretty nearly as the velocity; and when the motion is very swift, as in the case of a rifle-bullet, as the cube of the velocity; but when the motion is neither very rapid nor very slow, the law of the square of the velocity probably represents the truth very fairly. By  $g'$  is denoted the value of gravity at the height  $x$ , so that

$$g' = g \frac{a^2}{(a+x)^2}$$

$a$  being, as above, the radius of the earth. In the exponential term, we shall replace  $g'$  by  $g$ , as no sensible error can result therefrom. The value of  $\sigma v$  is constant, as by Boyle's and Mariotte's law it always =  $\sigma_0 v_0$ . Writing, therefore, for brevity—

$$\sigma_0 v_0 - M = c,$$

$$\frac{2\lambda}{M} = \alpha, \quad \frac{2cg}{M} = \beta, \quad \frac{g}{k} = n, \quad \frac{a}{n} = m,$$

the equation of motion takes the form

$$\frac{du^2}{dx} + \alpha e^{-nx} u^2 = \beta \frac{a^2}{(a+x)^2};$$

whence, following the usual rule for the integration of linear differential equations of the first order, and writing  $X$  for  $e^{-nx}$ , for convenience of printing,

$$\begin{aligned} u^2 e^{-nx} - M^2 &= \beta a^2 \int e^{-nx} \frac{dx}{(a+x)^2} \\ &= \beta a^2 \left\{ -\frac{e^{-nx}}{a+x} + a \int \frac{e^{-nx-nx} dx}{a+x} \right\} \\ &= \beta a^2 \left\{ -\frac{e^{-nx}}{a+x} + a \int \frac{dx}{a+x} (e^{-nx} - ne^{-2nx} - \frac{1}{2}n^2 e^{-3nx} - \dots) \right\} \\ &= \beta a^2 \left[ -\frac{e^{-nx}}{a+x} + a \{ e^{-nx} \text{Ei}(-nx - nx) \right. \\ &\quad \left. - ne^{-2nx} \text{Ei}(-2na - 2nx) \right. \\ &\quad \left. + \frac{1}{2}n^2 e^{-3na} \text{Ei}(-3na - 3nx) - \dots \right] + C. \end{aligned}$$

Herein put  $x=0$ , so that  $u=u_0$ , and we have

$$\begin{aligned} u_0^2 e^{-n \cdot 0} - M^2 &= \beta a^2 \left[ -\frac{e^{-n \cdot 0}}{a+0} + a \{ e^{na} \text{Ei}(-na) - ne^{2na} \text{Ei}(-2na) \right. \\ &\quad \left. + \frac{1}{2}n^2 e^{3na} \text{Ei}(-3na) - \dots \right] + C; \end{aligned}$$

whence, by subtraction,

$$\begin{aligned} u^2 e^{-nx} - u_0^2 e^{-n \cdot 0} &= \beta a^2 \left[ \frac{e^{-nx}}{a} - \frac{e^{-nx}}{a+x} + a \{ e^{na} \text{Ei}(-na - nx) \right. \\ &\quad \left. - ne^{2na} \text{Ei}(-2na - 2nx) + \dots - e^{na} \text{Ei}(-na) + me^{3na} \text{Ei}(-2na - 2nx) - \dots \right] \end{aligned}$$

therefore

$$\begin{aligned} u^2 &= u_0^2 e^{-n(1-x)} + \beta a^2 \left[ \frac{e^{-n(1-x)}}{a} - \frac{1}{a+x} \right. \\ &\quad \left. + a \{ e^{na} \text{Ei}(-na - nx) - e^{na} \text{Ei}(-na) - me^{3na} \text{Ei}(-2na - 2nx) \right. \\ &\quad \left. + me^{3na} \text{Ei}(-2na) + \frac{1}{2}n^2 e^{3na} \text{Ei}(-3na - 3nx) \right. \\ &\quad \left. - \frac{1}{2}n^2 e^{3na} \text{Ei}(-3na) + \dots \right] \end{aligned}$$

in which  $\text{Ei} x$  is used to denote the exponential integral of  $x$ , viz.:  $\int \frac{e^x}{x} dx$ , according to a recognised notation. The values of the integral  $\text{Ei} x$ , which may be regarded as a known function, have been tabulated (see *Philosophical Transactions* for 1870, pp. 367-388).

We thus have, except for temperature, the complete solution of the problem of the motion of the balloon so far as velocity and height are concerned; it would not be possible to connect the time and the height except by the

performance of another integration, for the practicability of which it would be necessary to submit to some loss of generality, viz., we should have to regard  $x$  as small as compared to  $a$ , and take  $\lambda$  as small, and so on. The equation last written gives the motion until the height (say  $h$ ) is attained at which the balloon becomes quite full, after which the gas begins to escape, and we have the second case of the problem.

Before proceeding, however, to the discussion of this second case, it is worth while to examine the solution more carefully, leaving out of consideration quantities that make no very great difference in the practical result, for the sake of simplicity. Supposing, then, gravity to be constant at all heights, and  $\lambda$  to be zero, the equation of motion takes the simplest form

$$\frac{d.u^2}{dx} = \beta$$

whence

$$u^2 - u_0^2 = \beta x;$$

and we see, what is pretty evident from general reasoning; that if a balloon, partially filled, rises at all, it will at least rise to such a height that it will become completely full.

The letters meaning the same as before, the equation of motion of a balloon completely filled at starting is

$$\begin{aligned} \left\{ M - V_0(\rho_0 - \rho) \right\} u \frac{du}{dx} &= g \frac{a^2}{(a+x)^2} \left\{ V_0 \sigma - M + V_0(\rho_0 - \rho) \right\} \\ &\quad - \lambda u^2 e^{-nx}, \end{aligned}$$

or substituting for  $\rho$  and  $\sigma$  their values

$$\begin{aligned} \left\{ M - V_0 \rho_0(1 - e^{-nx}) \right\} u \frac{du}{dx} &= g \frac{a^2}{(a+x)^2} \left\{ V_0 \sigma_0 e^{-nx} - M \right. \\ &\quad \left. + V_0 \rho_0(1 - e^{-nx}) \right\} - \lambda u^2 e^{-nx} \end{aligned}$$

The integral of this differential equation could be obtained in series as before, only that the resulting equations would be more complicated. As we do not propose to discuss the formulae obtained, it will be sufficient for our purpose to deduce an approximate solution by neglecting  $V_0 \rho_0(1 - e^{-nx})$  compared to  $M$ , viz., neglecting the mass of the gas that has escaped during the ascent compared to the mass of the whole balloon and appurtenances. It must be borne in mind, however, that when coal gas is used, and the ascent is to a great height, the mass of gas that escapes is by no means insensible. The equation thus becomes

$$\frac{1}{2} M \frac{du^2}{dx} + \lambda e^{-nx} u^2 = \frac{ga^2}{(a+x)^2} \left\{ V_0 \sigma_0 e^{-nx} - M \right\}$$

or

$$\frac{du^2}{dx} + \alpha e^{-nx} u^2 = \frac{\gamma a^2}{(a+x)^2} \left\{ V_0 \sigma_0 e^{-nx} - M \right\}$$

$\gamma$  being  $\frac{2g}{M}$ . This is an equation which can be integrated in exactly the same way as that previously considered, viz., by multiplying by a factor  $e^{-nx}$ , and integrating at once; thus,

$$\begin{aligned} u^2 e^{-nx} &= V_0 \sigma_0 \gamma a^2 \int \frac{e^{-nx-nx} dx}{(a+x)^2} - M \gamma a^2 \int \frac{e^{-nx} dx}{(a+x)^2} + C \\ &= V_0 \sigma_0 \gamma a^2 \left\{ -\frac{e^{-nx-nx}}{a+x} + \int \frac{dx}{a+x} (-ne^{-nx-nx} + \alpha e^{-2na-nx}) \right\} \\ &\quad - M \gamma a^2 \left\{ -\frac{e^{-nx}}{a+x} + a \int \frac{e^{-nx-nx} dx}{a+x} \right\} + C \\ &= V_0 \sigma_0 \gamma a^2 \left[ -\frac{e^{-nx-nx}}{a+x} \right. \\ &\quad \left. - n \{ e^{na} \text{Ei}(-na - nx) - me^{3na} \text{Ei}(-2na - 2nx) + \dots \} \right. \\ &\quad \left. - a \{ e^{3na} \text{Ei}(-2na - 2nx) - me^{3na} \text{Ei}(-3na - 3nx) + \dots \} \right] \end{aligned}$$

$$-M_1 \gamma^2 \left[ -\frac{e^{-n\pi}}{a+x} + a \right] e^{n\pi} \text{Ei}(-na-n\pi) \\ -m e^{2n\pi} \text{Ei}(-2na-2n\pi) + \dots \Big] + C,$$

and C is determined as before by putting  $x = 0$ , when we have  $u = u_0$ .

In this case  $u_0$  is not zero, except when the balloon starts from the earth quite full. The general case is, when the balloon is only partially filled on leaving; the previous equations then hold until a height  $h$ , at which it becomes quite full, when the motion changes, and is as just investigated. Then  $u_0$  becomes the velocity at the height  $h$ , and everything is measured from this height as if from the surface of the earth,  $a$  being then the radius of the earth  $+ h$ ,  $\rho_0$ ,  $\sigma_0$  the densities at height  $h$ , and  $\rho$ ,  $\sigma$  at height  $x + h$ , &c. We have therefore, except as regards time, completely determined the motion of a balloon inflated with gas in an atmosphere of constant temperature. The introduction of temperature would modify the motion considerably, but in the present state of science it cannot be taken into account.

Principle  
of the fire  
balloon.

The general principle of the equilibrium of a fire-balloon is, of course, identical with that of a gas-balloon; but the motion is different, as the degree of buoyancy at each moment varies with the temperature of the air within the balloon, and therefore with the heat of the furnace by which the air is warmed. Dry air expands  $\frac{1}{491}$  part of its volume for every increase of temperature of 1° centigrade, or  $\frac{1}{841}$ th of its volume for every increase of temperature of 1° Fahr. If, therefore, the air in an envelope or bag be heated 60° Fahr. more than the surrounding air, the air within the bag will expand  $\frac{60}{841}$ th of its volume, and this air must therefore escape. The air within the bag weighs less, therefore, than the air it displaces by the  $\frac{60}{841}$ th part of the latter; and if the weight of this be greater than the weight of the bag and appurtenances, the latter will ascend. It is, therefore, always easy to calculate approximately the ascensional power of a fire-balloon if the temperature of the surrounding air be known, and also the mean temperature of the air within the balloon. Thus, let the balloon contain  $V$  cubic feet of hot air at the temperature  $t'$  (Fahr.), and let the temperature of the surrounding air be  $t$  (Fahr.). Also, suppose the weight of the balloon, car, &c., is  $W$  lb, and let the barometer reading be  $h$  inches, then the ascensional power is equal to the weight of the air displaced - weight of the heated air -  $W$  lb, viz.,

$$\frac{h}{29.922} \left\{ \frac{V \times .080728}{1 + \frac{t-32}{491}} - \frac{V \times .080728}{1 + \frac{t'-32}{491}} \right\} \text{lb} - W \text{ lb},$$

.080728 lb being the weight of a cubic foot of air at temperature 32°, under the pressure of one atmosphere, viz., when the reading of the barometer is 29.922 in. Of course, the motion depends upon the temperature of the air in the balloon as due to the furnace, if the latter is taken up with the balloon; but if the air in the balloon is merely warmed, and the balloon then set free by itself, the problem is an easy one, as the rate of cooling can be determined approximately; but it is destitute of interest. We have said that dry air increases its volume by  $\frac{1}{491}$ th part for every increase of 1° (Fahr.), but the air is generally more or less saturated with moisture. This second atmosphere, formed of the vapour of water, is superposed over that of the air, as it were, and, in a very careful consideration of the question, should be taken into account. Even, however, when the air is completely saturated with moisture but little difference is produced; so that for all practical purposes the presence of the vapour of water in the air may be ignored. Of course the amount of vapour depends on

the dew-point, and tables of the pressure of the vapour of water at different temperatures are given in most modern works on heat; but, as has been stated, the matter, in an aeronautical point of view, is of very little importance. At first it was supposed that the cause of the ascent of the balloon of the Montgolfiers was traceable to the generation of gas and smoke from the damp straw which was set light to; but the advance of science showed that the fire-balloon owed its levity merely to the rarefaction of the air produced by the heat generated.

A formula giving the height, in terms of the readings of the barometer and thermometer, on the surface of the earth, and at the place the height of which is required, is easily obtained from the principles of hydrostatics. The formula given by Laplace, reduced to English units, is—

$$Z = \log \left( \frac{h}{h'} \right) \times 60159 \left( 1 + \frac{t+t'-64}{900} \right) (1 + .002837 \cos 2L) \\ \left( 1 + \frac{z+52251}{20886900} \right).$$

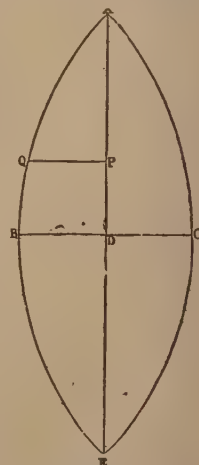
$Z$  being the height required in feet,  $h$ ,  $h'$  the heights of the barometer in inches at the lower and upper stations,  $t$ ,  $t'$  the temperatures (Fahr.) of the air at the lower and upper stations,  $L$  the latitude,  $z$  the approximate altitude, and 20,886,900 the earth's mean radius in feet. This was the formula used by Mr Glaisher for the reduction of his observations. It is open to the obvious defect that the temperature is assumed uniform, and equal to the mean of the temperatures at the upper and lower stations; but till the law of decline of temperature is better determined, perhaps this is as good an approximation to the truth as we can have without introducing needless complication in the formula.

A sphere is not a developable surface—i.e., it cannot be divided in any manner so as to admit of its being spread out flat upon a plane, so that no spherical balloon could be made of stiff plane material. However, the silk or cotton of which balloons are manufactured is sufficiently flexible to prevent any deviation from the sphere being noticeable. Balloons are made in *gores*, a gore being what, in spherical trigonometry, is called a *lune*, viz., the surface enclosed between two meridians. The approximate shape of these

gores is very easy to calculate. Thus, let  $ABEC$  be a gore, then the sides  $ABE$ ,  $ACE$ , are not arcs of circles, but curves of sines, viz.,  $PQ$  bears to  $DB$  the ratio that  $\sin AP$  does to  $\sin AD$ , or, which comes to the same thing, supposing  $AD = 90^\circ$ , and  $AP = \alpha^\circ$ , then  $PQ = BD \sin \alpha^\circ$ . It is thus easy, by means of a table of natural sines, to form a pattern gore, whatever the required number of gores may be. Thus, supposing there are to be  $n$  gores, then  $BC$  must be  $\frac{1}{n}$ th of the circumference—

viz.,  $\frac{2}{n}$ ths of  $AE$ ; and  $BD$

and  $AD$  being given, any number of points can be found on the curve  $ABE$  in the manner indicated above. A slight knowledge of spherical



Balloon Gore.

trigonometry shows the reason for the above rule. Balloons, as usually constructed, are spherical, except for the neck, which is made to slope down, so that the whole



shape resembles rather that of a pear. The pattern gore should originally be made as if for a spherical balloon, and afterwards the slight modification necessary for the formation of the neck should be applied.

The gores are sewn together, and a small portion of the upper end of each is cut away, so as to leave an aperture at the top of the balloon of from 1 to 3 feet in diameter. This space is occupied by the valve, which is generally made of strong wood, and consists of two semicircular shutters hinged to a diameter of the circular frame, and kept closed by a spring. The valve is opened by pulling a string, technically called the valve-line, which passes down through the balloon and out at the lower orifice in which the neck terminates. The net-work which, like the gores, is attached to the circumferences of the valve, passes over the surface of the balloon, and supports the ring or hoop from which the car is suspended by half a dozen strong ropes, of perhaps 4 or 5 feet in length. The net-work is thus stretched between the valve and the ring. It is very important that all the ropes by which the car hangs from the ring should be so adjusted that each may bear pretty nearly the same weight, as otherwise the whole net-work and balloon will be strained, and perhaps to a serious extent. The car is usually merely a large basket made of wicker-work. The neck of the balloon should be 7 or 8 feet above the car, so that the aeronaut can easily reach it by mounting into the ring. The best material for the envelope is silk; but on account of the expense cotton or alpaca is generally used: in all cases it must be varnished, in order to render it more impervious to the gas. The grapnel or anchor is a large five-pronged hook attached to the ring by a rope 100 or 120 feet long. The first care of the aeronaut on leaving the earth is to lower the grapnel gently to the full extent that the rope will permit. Thus, when the balloon is in the air, the grapnel hangs down below it, and when the descent is being effected, is the first thing to touch the ground. If the descent is well managed, and the balloon is moving downwards slowly, the weight of which it is relieved when the grapnel is supported by the earth checks any further descent, and the wind carries the balloon along horizontally, the grapnel trailing over the ground until it catches in some obstruction and is held fast. The balloon is then in much about the same position as a kite held by a string, and if the wind be strong, plunges about wildly, striking the ground and rebounding, until the aeronaut, by continued use of the valve-line, has allowed sufficient gas to escape to deprive it of all buoyancy and prevent its rising again.

The chief danger attending ballooning lies in the descent; for if a strong wind be blowing, the grapnel will sometimes trail for miles over the ground at the rate of ten or twenty miles an hour, catching now and then in hedges, ditches, roots of trees, &c.; and, after giving the balloon a terrible jerk, breaking loose again, till at length some obstruction, such as the wooded bank of a stream, affords a firm hold. If the balloon has lost all its buoyant power by the escape of the gas, the car also drags over the ground. But even a very rough descent is usually not productive of any very serious consequences; as, although the occupants of the car generally receive many bruises, and are perhaps cut by the ropes, it rarely happens that anything worse occurs. On a day when the wind is light (supposing that there is no want of ballast) nothing can be easier than the descent, and the aeronaut can decide several miles off on the field in which he will alight. It is very important to have a good supply of ballast, so as to be able to check the rapidity of the descent, as in passing downwards through a wet cloud the weight of the balloon is enormously increased by the water deposited on it; and if there is no ballast to throw out to compensate this accession of mass,

the velocity is sometimes very great. It is also convenient, if the district upon which the balloon is descending appear unsuitable for landing, to be able to rise again. The ballast consists of fine baked sand, which becomes so scattered as to be inappreciable before it has fallen far below the balloon. It is taken up in bags containing about  $\frac{1}{2}$  cwt. each. The balloon at starting is liberated by a spring catch which the aeronaut releases, and the ballast should be so adjusted that there is nearly equilibrium before leaving, else the rapidity of ascent is too great, and has to be checked by parting with gas. It is almost impossible to liberate the balloon in such a way as to avoid giving it a rotary motion about a vertical axis, which continues during the whole time it is in the air. This rotation makes it difficult for those in the car to discover in what direction they are moving; and it is only by looking down along the rope to which the grapnel is suspended that the motion of the balloon over the country below can be traced. We may mention that the upward and downward motion at any instant is at once known by merely dropping over the side of the car a small piece of paper: if the paper ascends or remains on the same level or stationary, the balloon is descending; while, if it descends, the balloon is ascending. This test is so delicate that it sometimes showed the motion at a particular instant with more precision than did Mr Glaisher's very delicate instruments.

Contrivances are often proposed by which the valve might be opened in less crude ways than by merely pulling a string attached to it; by which the jerks produced by the catching of the grapnel might be diminished, &c. These improvements are not adopted, because simplicity is requisite before everything. Any mechanical contrivance might be broken and rendered useless by the first blow of the car on the earth; whereas the primitive arrangements in use are such that scarcely any rough treatment can impair their efficiency.

The most important works that have appeared on the subject of aerostation are—

*Dædalus, or Mechanical Motions*, by Bishop Wilkins, London, 1648; *A Treatise on the Nature and Properties of Air and other Permanently Elastic Fluids*, by Tiberius Cavallo, London, 1781; *Account of the First Aerial Voyage in England, in a Series of Letters to his Guardian*, by Vincent Lunardi, London, 1784; *History and Practice of Aerostation*, by Tiberius Cavallo, London, 1785; *Annals of some Remarkable Aerial and Alpine Voyages, including those of the author*, by T. Foster, London, 1832; *Aeronautica*, by Monck Mason, London, 1838; *A System of Aeronautics, comprehending its Earliest Investigations*, by John Wise, Philadelphia, 1850; *Astra Castra, Experiments and Adventures in the Atmosphere*, by Hutton Turner, London, 1865; *Voyages Aériens*, par J. Glaisher, C. Flammarion, W. de Fonvielle, et G. Tissandier, Paris, 1870; the same translated into English and published, edited by James Glaisher, under the title, *Travels in the Air*, London, 1871.

All the above books we have seen ourselves, and used in the preparation of the present article. *Astra Castra* is a work of 530 pp. large quarto; it consists chiefly of extracts from other works and writings, and it is useful as affording data for a history rather than as a history itself. On pp. 463-465 is a list of books and papers on aeronautics, which seems fairly complete up to the date 1864. In the list are also included memoirs and papers which we have not noted in the last paragraph, as the most important of them are referred to under their special subjects in the course of this article. We should advise any one desirous of studying the history of aeronautics to consult Mr Turner's list in *Astra Castra*, which is the most perfect we have met with. He has marked with an asterisk those works that may be consulted by the public in the library of the Patent Office, which contains, besides books, a valuable collection of prints and broadsheets on the subject of aerostation. (J. A.)

Works of  
aerosta-  
tion.

Construc-  
tion of  
balloon.

Practice of  
aerosta-  
tion.

**ÆRTSZEN**, PIETER, called "Long Peter" on account of his height, an historical painter of great merit as regards both drawing and colouring, was born at Amsterdam in 1520, and died in 1573. When a youth he distinguished himself by painting homely scenes, in which he reproduced articles of furniture, cooking utensils, &c., with marvellous fidelity, but he afterwards cultivated historical painting. Several of his best works—altar-pieces in various churches—were destroyed in the religious wars of the Netherlands. An excellent specimen of his style on a small scale, a picture of the crucifixion, may be seen in the Antwerp Museum. Ærtszen was a member of the Academy of St Luke, in whose books he is entered as *Langhe Peter, schilder*. Three of his sons attained to some note as painters.

**ÆS** is commonly translated *brass*, but the *æs* of the Romans, like the *χαλκός* of the Greeks, was used to signify not only pure copper, but also a *bronze*, or alloy of copper and tin. *Brass*, in the modern acceptance of an alloy of copper and *zinc*, was unknown to the ancients. The cutting instruments of the ancient Greeks, Romans, and Egyptians were originally of bronze. The Romans borrowed their arms, as well as their money, from the Etruscans. Analysis of the bronzes of these nations shows that they contained about 12 per cent. of tin, which gave them hardness and the capability of receiving a good edge. As the most ancient coined money of the Romans was of copper or bronze, *æs* came to be used for money in general, even after the introduction of silver and gold coinage; and *æs alienum* was used to signify *borrowed money, debt*. *Æs equestre*, *Æs hordearium*, *Æs militare*, were terms for the pay of Roman soldiers (previous to the introduction of the regular *stipendium*), which was furnished, it would appear, not from the public treasury, but by certain private persons as decreed by the state. The first, which amounted to 10,000 *asses*, was the purchase-money of the horse of an *eques*. The second, amounting to 2000 *asses*, was the pay of an *eques*, and was furnished by unmarried women, widows, and orphans, if possessed of a certain amount of property. The *æs militare*, reckoned by Niebuhr at 1000 *asses* a year, was the pay of a foot soldier.

**ÆSCHINES**, an Athenian philosopher, said to have been the son of a sausage-maker. He was continually with Socrates; which occasioned that philosopher to say that the sausage-maker's son was the only person who knew how to pay a due regard to him. It is alleged that poverty obliged him to go to Sicily to the court of Dionysius; and that he met with great contempt from Plato, but was extremely well received by Aristippus, to whom he showed some of his dialogues, receiving from him a handsome sum of money. He did not venture to profess philosophy at Athens, Plato and Aristippus being in such high esteem; but he opened a school, in which he taught philosophy to maintain himself. He afterwards wrote orations for the forum. Phrynicius, in Photius, ranks him amongst the best orators, and mentions his orations as the standard of the pure Attic style. Hermogenes has also spoken very highly of him. He wrote, besides, several dialogues:—1. Concerning virtue, whether it can be taught; 2. Eryxias, or Erasistratus: concerning riches, whether they are good; 3. Axiochus: concerning death, whether it is to be feared,—but those extant on the several subjects are not genuine remains. M. le Clerc has given a Latin translation of them, with notes and several dissertations, entitled *Silvæ Philologicae*.

**ÆSCHINES**, a celebrated Grecian orator, was born in Attica 389 years before the Christian era. According to his own account, he was of distinguished birth; according to that of Demosthenes, he was the son of a courtesan, and a humble performer in a company of comedians. But whatever was the true history of his birth and early life,

his services as a soldier, and his talents, which were considerable, procured him great applause; and, as a public speaker, he became a formidable rival to Demosthenes himself. The two orators, inspired probably with mutual jealousy and animosity, became at last the strenuous leaders of opposing parties. Æschines had almost from the first advocated peace with Philip of Macedon, and having been sent on several embassies to negotiate with the king, had been treated with much respect. He was, in consequence, accused by Demosthenes of having received money as a bribe when he was employed on one of these embassies. He indirectly retaliated by bringing an accusation against Ctesiphon, the friend of Demosthenes, for having moved a decree, contrary to the laws, to confer on Demosthenes a golden crown as a mark of public approbation. A numerous assembly of judges and citizens met to hear and decide the question. Each orator employed all his powers of eloquence; but Demosthenes, with superior talents, and with more justice on his side, was victorious; whereupon Æschines went into exile. According to Plutarch, the resentment of Demosthenes was now softened into generous kindness; for when Æschines was going into banishment, he requested him to accept of a sum of money; which made him exclaim, "How do I regret leaving a country where I have found an enemy so generous, that I must despair of ever meeting with a friend who shall be like him!" But this story seems more than doubtful. Æschines, after staying some years in Asia Minor, opened a school of eloquence at Rhodes. He is said to have commenced his lectures by reading to his audience the two orations which had been the cause of his banishment. His own oration received great praise, but that of Demosthenes was heard with boundless applause. In so trying a moment, when vanity must be supposed to have been deeply wounded, he is reported to have said, with a noble generosity of sentiment, "What would you have thought if you had heard him thunder out the words himself!" Æschines afterwards removed to Samos, where he died in the 75th year of his age. Three only of his orations are extant. His eloquence is of a very high order, and as an orator he is second only to Demosthenes.

**ÆSCHYLUS**, the father of the Greek tragic drama, was born in the year 525 B.C., in the Attic demos of Eleusis. The period of his youth and manhood coincides, therefore, with that great uprising of the national spirit of the Greeks, caused by the successive attempts of Darius, king of Persia, and his son Xerxes, to enslave their European neighbours on the north and west shores of the Ægean; and it was no doubt as much for the advantage of his poetical faculty as for the development of his manhood, that he took an active part in those famous military achievements by which the march of the insolent Asiatic hosts was repelled. The father of Attic tragedy helped, in the year 490, to drive the captains of Darius into the marshes of Marathon, and, ten years later, encompassed with ruin the multitudinous armament of Xerxes within the narrow strait of Salamis. The glories of this naval achievement, the bard who had helped to win it with his sword afterwards lived to celebrate with the lyre, and left to the world the play of the *Persians*, as a great national record of combined poetry and patriotism almost unique in history. Of his subsequent career at Athens only a few scanty notices remain, and those chiefly connected with the representation of his plays. We know that he composed seventy plays, and that he gained the prize for dramatic excellence thirteen times; further, that the Athenians esteemed his works so highly as to allow some of them to be represented after his death,—a privilege, in their dramatic practice, altogether anomalous. We know, also, that in the course of his life he paid one or two visits to Sicily, to which country he was attracted,



no doubt, by the same literary influence in the person of its ruler Hiero, that drew thither Bacchylides, Simonides, and other notable men of that rich epoch. There can, at the same time, be little doubt that one cause of his visits to that island may have been a want of sympathy as to political matters between him and the Athenian public; for while the Athenians, from the time of Cleisthenes (A.C. 510), had been advancing by rapid and decided steps to the full expansion of the democratic principle, it is evident, from some passages in his plays, especially from the whole tone and tendency of the *Eumenides*, that the political leanings of the poet of the *Prometheus* were towards aristocracy, and that, in the days of Pericles, he foresaw, with a sorrowful fear, the ripeness of those democratic evils which within so short a period led Xenophon to seek a new fatherland in Sparta, and opened to the Macedonian a plain path to the sovereignty of Greece. But whatever may have been his motives for retiring from the scene of so many literary triumphs (and the gossipers of ancient times have of course transmitted to us their pleasant inventions on this point), it is certain that, in the year A.C. 456, two years after the representation of his great trilogy, the *Orestiad*, he died at Gela, in Sicily, in the sixty-ninth year of his age; and the people of Gela, rejoicing in his bones, as Ravenna does in those of the banished Dante, inscribed the following memorial on his tomb:—

"Here Æschylus lies, from his Athenian home  
Remote, 'neath Gela's wheat-producing loam;  
How brave in battle was Euphorion's son,  
The long-haired Mede can tell who fell at Marathon."

And thus he lives among posterity, celebrated more as a patriot than as a poet; as if to witness to all times that the great world of books, with all its power, is but a small thing unless it be the reflection of a greater world of action. Of the seventy plays which an old biographer reports him to have composed, only seven remain, with a few fragments of little significance save to the keen eye of the professed philologist. These fragments, however, are sufficient to justify the high esteem in which he was held by the Athenian public, and by that greatest of all the great wits of a witty age and a witty people, Aristophanes. In the grand trilogy which exhibits, in three consecutive tragedies, the story of the murder of Agamemnon, and its moral sequences, we have a perfect specimen of what the Greek tragedy was to the Greeks, as at once a complex artistic machinery for the exhibition of national legend, and a grave pulpit for the preaching of important moral truths; nor could a more worthy funder than Æschylus of such a "sacred opera" be imagined. His imagination dwells habitually in the loftiest region of the stern old religious mythology of primeval Greece; his moral tone is pure, his character earnest and manly, and his strictly dramatic power (notwithstanding the very imperfect form of the drama in his day), as exhibited more especially in the *Agamemnon*, in the *Eumenides*, and in some parts of the *Prometheus*, is such as none of his famous successors, least of all Euripides, could surpass. Of his other plays, the *Seven against Thebes* is a drama, as Aristophanes expressed it, "full of war," and breathes in every line the spirit of the age and of the people that saved Europe from the grasp of oriental despotism; the *Persians*, though weak in some parts, contains some fine choral poetry, and a description of the battle of Salamis, that will belong to the poetry of the world so long as the world lasts; while the *Suppliants* presents much in a tasteful translation that makes us lament the loss of the missing piece of the trilogy to which it belonged, no less than the blundering of the thoughtless copyists of the middle ages, by whose pen it has been so egregiously defaced. For in ancient times the flowing rhetorical Euripides was found a more useful model for the schools

of eloquence than the lofty, stern, and sometimes harsh, and occasionally it may be obscure, Æschylus; therefore the text of the latter has been comparatively neglected, and much work was left for the tasteful philologist before many parts of his noblest choruses could be rendered legible. Of the editions of Æschylus, the most notable in the earlier times of modern scholarship is that of Stanley; in more recent times, that of Schütz, who undertook the work of restoration with much learning and great boldness. The impulse given by this scholar was moderated by Wellauer, who, in his edition, along with some happy emendations, principally endeavoured to vindicate the authority of the manuscript readings from the large license of conjectural critics; and now from the remains of the great Hermann has been published a text that should present the just medium between the timidity of Wellauer and the rashness of mere conjectural criticism, though it is much to be feared that the learned German has been not seldom led astray by the itch of emendation; which is the old besetting sin of critical scholarship. Of English poetical translations there are the old one by Potter, and recent ones by Blackie, Plumptre, and Swanwick. There is also a translation in literal prose by Buckley. (J. S. B.)

ÆSCULAPIUS, in the *Heathen Mythology*, the god of medicine, was the son of Apollo and the nymph Coronis. He was educated by the centaur Chiron, who taught him the art of healing; and his skill enabled him to cure the most desperate diseases. But Jupiter, enraged at his restoring to life Hippolytus, who had been torn in pieces by his own horses, killed him with a thunderbolt. According to Cicero, there were three deities of this name: the first, the son of Apollo, worshipped in Arcadia, who invented the probe and bandages for wounds; the second, the brother of Mercury, who was killed by lightning; and the third, the son of Arsippus and Arsinoe, who was the first to teach tooth-drawing and purging. At Epidaurus, Æsculapius's statue was of gold and ivory, with a long beard, the head surrounded with rays, a knotty stick in one hand, and the other entwined with a serpent: the figure was seated on a throne of the same materials as the statue, and had a dog lying at its feet. The Romans crowned him with laurel, to represent his descent from Apollo; and the Phliasiens represented him as beardless. The cock, the raven, and the goat were sacred to this deity. His chief temples were at Pergamos, Smyrna, Tricca, a city in Thessaly, and the isle of Coos; in all which places votive tablets were hung up, showing the names of those cured and the diseases of which they were healed by his assistance. But his most famous shrine was at Epidaurus, where, every five years, games were celebrated in his honour, nine days after the Isthmian games at Corinth.

ÆSIR (plural of *As*, or *Ass*, god), the gods of the Northmen of Scandinavia and Iceland. There were twelve chief gods or Æsir besides Odin (the *All-father*, viz., Thor, Baldur, Njörd, Frey, Týr or Týr, Bragi, Heimdal, Hød, Vidar, Ull, Forseti, Loki or Lopt). The chief goddesses of ASGARÐ (*g.u.*), the Odinic Olympus, were—Frigg, Freyia, Nanna, Sif, Saga, Hel, Gefion, Eir, Hlin, Lofn, Vör, Snotra. The names of the Æsir, considered in the primary old northern significance of the words, convey in most instances an allusion to their characteristics; but it is impossible to decide whether they merely personify certain physical powers in nature, and abstract ideas of definite mental conditions, or whether they were originally borne by individuals connected with the pre-historic ages of the people. It is probable that the ideas underlying the myths connected with the Æsir have a mixed origin, and may be referred to a blending of physical, material, and historical elements. Our knowledge of northern mythology has been derived principally

from the fragmentary remains of ancient Scandinavian songs, first collected in Iceland in the 11th century, and embodied in the 13th century with numerous other prose and poetic myths in a compilation now known to us as the *Eddas*. From these highly interesting but frequently obscure sources we are able to reproduce to a certain extent the image and conception of each of the *Æsir*, as they presented themselves to the imagination of their early northern worshippers.

In *Thor*, who seems to have been a god of that earlier Phœnician form of nature-worship which was superseded in Scandinavia and Northern Germany by the faith of Odin, we have the impersonation of the disturbing and destructive agencies in the universe. He is the son of heaven and earth—of Odin, the All-father, and of Frigg or Frörgvin, the vivifying—and is the strongest of the *Æsir*. From his hammer flashed the lightning, and his chariot wheels sent thunder rolling through the clouds as he went on his way, cleaving mountains, loosening the pent-up streams and fires, and slaying all giants and misshapen monsters. Ever busily engaged in these labours, he seldom tarried in Asgard with the other *Æsir*, but dwelt in his mansion, Bilskirnir, in the densest gloom of the clouds. With his mallet he consecrated the newly-wedded, and hence the sign of the mallet or hammer was made by the Northmen when they took an oath and bound themselves by vows, whether of marriage or any other obligation. The early Christian missionaries of Norway, finding the faith in Thor too strong to be suddenly uprooted, tried to transfer many of his characteristics to their zealous royal convert, St Olaf, who was said to have resembled the old northern god in his comeliness of person, his bright red beard, hot, angry temper, and personal strength; while some of the monks of a later period endeavoured to persuade the Northmen that in Thor their forefathers had worshipped the Christ, the strong and mighty Saviour of the oppressed, and that his mallet was the rude image of the cross. Slaves and all thralls killed in battle were believed to be under the protection of Thor, who, as god of the Finns before the spread of the *As* religion, was honoured as their special guardian against the tyranny of their new masters.

In *Baldur* the Northmen honoured all that was beautiful, eloquent, wise, and good, and he was the spirit of activity, joy, and light; but his name signifies the strong in mind, and the earliest conception of Baldur is that of mental rather than physical or material perfection. His wife, Nanna, reflected these attributes in a less degree. On his life depended the activity and happiness of all the *Æsir*, excepting only Loki, the earthly fire or incarnation of evil, and hence this *As*, from envy of the beauty and innocence of Baldur, brought about his death, and hindered his release from the power of Hel, the goddess of death.

According to the myth, the *Æsir*, distressed at Baldur's presentiment of his own approaching end, joined his mother, Frigg, in exacting an oath from animals, plants, and minerals, not to injure him. The mistletoe alone among plants had been forgotten, and when this was discovered by Loki he pulled a wand of it, and hastening to the assembly of the *Æsir*, where all were engaged in the sport of shooting at Baldur, as he was supposed to be invulnerable, he gave it to Hôd, the blind god of brute strength, and directed him how to aim it. The mistletoe pierced Baldur through, and he fell dead to the ground in the presence of the *Æsir*, who, foreseeing the evil that would befall them, since light and purity had been taken from them, gave way to sorrow and fear. When all their efforts to release Baldur from Hel had been thwarted by the machinations of Loki, they resolved to avenge themselves. Having captured their foe, they confined him within a mountain-cave, and hung above his head a venomous snake, to drop its poison on his face; but his wife, Signy, stood by him, and caught the drops in a cup, and it was only while she emptied the goblet that the venom touched him, when he shrank aside, and caused the earth to be shaken as with an earthquake. There Loki will remain till *Ragnarök*, the twilight of the world, when the *Æsir*, the earth, and

all dwellers therein, will be destroyed by the powers of evil, the rescuers and companions of Loki. Only Odin, the All-father, will survive, and gather around him on Ida's plain, where Asgard had once stood, the *Æsir*, regenerate and purified by Surt's black fire, and then a new and better world will arise, in which Baldur will again come with his unconscious slayer, Hôd, and all evil will cease, and light and darkness will dwell together in unity.

Under one form of the myth of Baldur's death he is the bright god of day or summer, and Hôd, the blind and the strong, is dark night or fiercely-raging winter, his pre-ordained foe and destroyer. After that final purification by suffering or fire, and the regeneration to which the Northmen looked as the means of the ultimate adjustment of the disturbed balance between evil and good, and from which they did not exempt their gods, the influence of good was to prevail. Baldur would reappear, and Loki, the consuming power of evil, be no more heard of.

*Loki*, in the beginning of time, under the name of Lodthurr, flame, and as the foster-brother of the All-father, had united with him in imparting blessings to the universe, and had given blood and a fair colour to Ask and Embla, from which the first men were created. Afterwards he left the council of the *Æsir*, and like a fallen angel wandered away into regions of space, desolating and consuming all things that came in contact with his fierce flame. Descending into the bowels of the earth, where his presence is made manifest by volcanic fires, he consorted with evil giantesses, by whom he became the father of Hel, pallid death; of Angurboda, the announcer of sorrow; and of the wolf Fenrir, and the serpent of Midgard, which are ever threatening the destruction of the world and the peace of the *Æsir*.

Loki can assume all forms. As sensuality he courses through the veins of men, and as heat and fire he pervades nature, causing death and destruction. After the introduction of Christianity, the attributes and mystic deeds of Loki were transferred to Satan by the people of Scandinavia, amongst whose descendants his name still retains its evil reputation. In Iceland an *ignis fatuus* is known as Loki's burning; and in Jutland, when there is a dazzling light or a waving motion in the air which impedes the sight of distant objects, the peasants say, "Loki is sowing his oats."

*Njôrd*, supposed to be the Nerthus known to the Romans, and his children Frey or Frizzo and Freyja, appear to have been honoured in the north before the time of Odin, and to have been worshipped by peoples powerful enough to have been admitted into friendly alliance with his followers. Njôrd is said to have lived in Vanaheim, and to have ruled over the Vanir, or light elves, long before he became one of the *Æsir*. He is god of the ocean, the ruler of winds and stiller of waves, and to him the seafarer and fisherman raise altars and make prayers. His attributes and powers seem to point to the existence of a superior knowledge of navigation among those ancient races of Scandinavia who have been idealised in the imagination of the Northmen as good, bright, and agile elves and water-sprites—the *Lios Alf*—or Vanir of their mythology. Njôrd's *sister Frey* is the god of rain, plenty, and fruitfulness; and his worship, according to the early northern chronicler, Adam of Bremen, was accompanied with phallic rites. His sister and wife, Freyja, who holds a high place among the *Æsir*, is the goddess of love; but her influence, unlike her husband's, is not always beneficent, and varies with the form which she assumes in operating on the minds of men. Her chariot is drawn by cats, as emblematic of fondness and passion, and a hog attends upon her and upon Frey, whose name, like her own, implies fructification or enjoyment.

The Swedes paid especial honour to Frey, while the Norwegians worshipped Thor (who was in all respects his opposite) as their chief *As*. The latter must also have received divine honours amongst the Germans, as his name is included in the form of objurcation used by the early Saxon missionaries; but this fact and the German name of the fifth day of the week—Donners-tag, the Thunderer's day—are



the only evidences still extant of the early worship of Thor in Germany.

By their alliance with Njörd and his children the Æsir secured fertility to the earth and mankind, and the intervention of mild fertility agencies in nature to counteract the destructive influence of Thor's power.

In *Týr* or *Týr* we have the Mars of the Northmen. It is he who gives victory, and although he is as wise as he is brave, it is he who stirs men to strife, and not to peace. His name, which signifies honour, is found in the names of the days of the week in O. Nor., Dan., A.-S., and in our own "Tuesday," and shows that, like Thor and Frey or Freyia, whose memory is perpetuated in our Thursday and Friday, the worship of this bravest of the Æsir was widely spread among peoples of Northern origin.

In *Bragi* the Northmen honoured the originator of their Skaldic poetry, the god of eloquence and wise utterances. At guilds and at grave-feasts the Bragi-cup was drunk; and at the funeral of kings or jarls the heir was not permitted to take his father's seat till the "Bragarfull" was brought in, when, rising to receive it, he drank the contents of the cup, and was led to the high seat of honour. At guild feasts the Bragi-cup was signed with Thor's mallet, and was drunk after the company had drained Odin's cup for victory, and Njörd's and Frey's cup for a bountiful year.

The peculiarity of Bragi's cup was that, on drinking it, a vow—held to be inviolable—was made to perform some deed worthy of a skald's song. Bragi's wife, Idun, as the guardian of the casket which contained apples that gave to those who ate them perpetual youth, was specially cherished by the other Æsir. In her abduction by the giant Thiafi, and her removal to the nether world through Loki's craft, her mute grief, and her release in the spring, we have an analogy with the myth of Proserpine; and like her she presides over fresh verdure.

*Heimdall*, whose attribute is the rainbow, is the god of watchfulness, the doorkeeper of the Æsir; while *Vidar*, the strongest of the gods after Thor, is the impersonation of silence and caution; *Ull* decides the issue of single combats, and *Forseti* settles all quarrels.

In the goddesses *Lofn* and *Vör* lovers find protectors; the former unites the faithful, the latter punishes the faithless. *Gefion*, to whom the Danes owe the formation of the island Seeland, watches over maidens, and knows the decrees of fate. *Hlin* guards those whom *Frigg*, the queen and mother of heaven, is desirous of freeing from peril; *Frigg* herself, as Odin's wife and the mother of the Æsir, knows the destinies of men, but is silent in regard to them. As goddess of the earth, she is known as *Frygga*, the fertile summer earth, and *Rinda* the frost-hardened surface, and is attended by *Fulla*, the full, *Éir*, the young goddess of healing, and many other goddesses.

*Saga*, whose name is derived from *Segja*, to narrate, is the goddess of history and narration. Odin and she pledge each other daily in golden cups filled from the copious ever-flowing streams of her abode, *Socknabek* (from *Sökk*, abyss, in allusion to the abundant streams of narrative). *Snotra* is the goddess of sagacity and elegance, from whom men and women seek good sense and refinement of manners. The Norns and the Valkyriur, if not actually goddesses, are closely connected with the Æsir. The three principal Norns or Nornir are *Urd*, past time; *Verdandi*, present time; and *Skuld*, future time. They and the Valkyriur, who are known under many names, twist and spin the threads of destiny, and make known what has been decreed from the beginning of time.

From this brief outline it may be seen that in their Æsir the Northmen recognised the creators, sustainers, and regulators of the world as it now is, from whom emanated the thought and life that pervade and animate all nature, and the efforts to subject it to the spiritual will. With Odin and the Æsir the intellectual life of the northern people began; and although they ascribed to them

human forms and acts, these were seldom without something higher and nobler than what pertains to mortals; and while they recognised the existence of a state of chaos and darkness before this world began with the creation of the Æsir, they anticipated the advent of another state, in which gods, like men, would receive their award at the hands of a supreme All-father. (E. C. O.)

ÆSOP, the fabulist, is supposed to have been born about the year 620 B.C., but the place of his birth is uncertain, that honour being claimed alike by Samos, Sardis, Mesembria in Thrace, and Cotæum in Phrygia. He was brought, while young, to Athens as a slave, and having served several masters, was eventually enfranchised by Iadmon the Samian. He thereupon visited Croesus, king of Lydia, at whose court he is represented by Plutarch as reproving Solon for his discourteous manner towards the king. During the usurpation of Pisistratus he is said to have visited Athens, and composed the fable of *Jupiter and the Frogs* for the instruction of the citizens (Phædrus, i. 2). As the ambassador of Croesus at Delphi he was charged with the payment of the large sum of four minæ to each of the citizens; but in consequence of some dispute, he declined to distribute the money. The Delphians, incensed at his conduct, accused him of sacrilege, and threw him headlong from a precipice, about 564 B.C. A pestilence which ensued being attributed to this crime, the people declared their willingness to make compensation for his death; which, in default of a nearer connection, was claimed and received by Iadmon, the grandson of his old master (Plut. *de sera Num. Vind.*, p. 556, Herodot. ii. 134). None of Æsop's works are extant. The popular stories regarding him are derived from a life prefixed to a book of fables purporting to be his, collected by Maximus Planudes, a monk of the 14th century, in which he is represented as a monster of ugliness and deformity, a notion utterly without foundation, and doubtless intended to heighten his wit by the contrast. That this life, however, was in existence a century before Planudes's time, appears by a manuscript of it found at Florence, and published in 1809. In Plutarch's *Convivium*, where Æsop is a guest, though there are many jests on his original servile condition, there are none on his appearance; and it would seem that the ancients were not usually restrained by delicacy in this point, since the personal defects of Socrates, and his resemblance to old Silenus, afford ample matter for merriment and rillery in the *Symposium* of Plato. We are told, besides, that the Athenians erected in honour of Æsop a noble statue by the famous sculptor Lysippus, a circumstance which alone would be sufficient to confute the absurd fiction of his deformity; but more to the point is the statement of Pliny (xxxvi. 12), that he was the *Contubernalis* of Rhodopis, his fellow-slave, whose extraordinary beauty passed into a proverb:

"Ἀνὰρ θύοια, καὶ Ῥοδῶπις ἡ καλὴ."

The obscurity in which the history of Æsop is involved has induced some to deny his existence altogether; and Giambattista Vico, in his *Scienza Nuova*, chooses rather to consider him as an abstraction, an excess of scepticism which is quite unreasonable. Whether Æsop left any written fables has been more justly disputed, and Bentley inclines to the negative. Thus Aristophanes (*Vespe*, v. 1259) represents Philocleon as learning his fables in conversation, and not from a book; and Socrates essayed to versify such as he remembered (Plat. *Phæd.* p. 61). Others, again, are of opinion that a collection had been made of them before the time of Socrates (*Mus. Crit.* i. 408). It is, however, certain that fables bearing Æsop's name were popular at Athens during the most brilliant period of its literary history; though the discrepancies of authors in quoting the same fables seem in favour of Bentley's hypothesis. (Compare Aristot. *De Part. Anim.*

iii. 2; and Lucian, *Nigr.* 32). The original fables were in prose, and were turned into verse by several writers; the first, after the example of Socrates, being Demetrius Phalereus. Next appeared an edition in elegiac verse, often cited by Suidas, but the author's name is unknown; then Babrius, an excellent Greek poet, turned them into choliambics (i.e. *limping* iambics); but of ten books, a few fables only are preserved entire. Of the Latin writers of Æsopian fables, Phædrus is the most celebrated

"Æsopus auctor quam materiam reperit,  
Hanc ego polivi versibus senariis."  
PHÆD.

The fables now extant in prose under Æsop's name are entirely spurious, as is proved by Bentley in his *Dissertation on the Fables of Æsop*, and have been assigned an oriental origin. The identification of Æsop with the Arabian philosopher and fabulist Lokman (who is made by some traditions the contemporary of the psalmist David) has frequently been attempted; and the Persian accounts of Lokman, which among other things describe him as an ugly black slave, appear to have been blended by the author of the *Life*, published by Planudes, with the classical stories respecting Æsop. The similarity of the fables ascribed to each renders it probable that they were derived from the same Indo-Persian source, or from the Chinese, who appear to have possessed such fables in very remote antiquity. A complete collection of the Æsopian fables, 231 in number, was published at Breslau by J. G. Schneider in 1810.

ÆSOP, a Greek historian, whose life of Alexander the Great is preserved in a Latin translation by Julius Valerius. It is a work of no credit, abounding in errors.

ÆSOP, CLODIUS, a celebrated actor, who flourished about the 670th year of Rome. He and Roscius were contemporaries, and the best performers who ever appeared upon the Roman stage; the former excelling in tragedy, the latter in comedy. Cicero was on intimate terms with both actors, and put himself under their direction to perfect his action. Æsop performed many friendly services to Cicero, especially during the period of his banishment. He appears to have spared no pains to improve himself in his art, and to have always studied his part with the greatest care. On the stage his declamation was emphatic and his action vehement, and he became entirely absorbed in his part. Plutarch mentions it as reported of him, that while he was representing Atreus deliberating how he should revenge himself on Thyestes, he forgot himself so far in the heat of action that with his truncheon he struck and killed one of the servants crossing the stage. His age and the time of his death are uncertain; but he made his last appearance on the stage in B.C. 55, at the dedication of Pompey's theatre, on which occasion his voice failed him. Æsop lived in a somewhat expensive manner; but he nevertheless contrived to leave an ample fortune to his spendthrift son. This is the son of Æsop mentioned by Horace (*Sat.* iii. 3, 239) as taking a pearl from the eardrop of Cæcilia Metella, and dissolving it in vinegar, that he might have the satisfaction of swallowing eight thousand pounds' worth at a draught.

ÆSTHETICS is the term now employed to designate the theory of the Fine Arts—the science of the Beautiful, with its allied conceptions and emotions. The province of the science is not, however, very definitely fixed, and there is still some ambiguity about the meaning of the term, arising from its etymology and various use. The word æsthetic, in its original Greek form (*αισθητικός*), means anything that has to do with perception by the senses, and this wider connotation was retained by Kant, who, under the title Transcendental Æsthetic, treats of the *a priori* principles of all sensuous knowledge. The limitation of the term to

the comparatively narrow class of sensations and perceptions occupied with the Beautiful and its allied properties is due to the Germans, and primarily to Baumgarten, who started from the supposition that, just as truth is the end and perfection of pure knowledge or the understanding, and good that of the will, so beauty must be the supreme aim of all sensuous knowledge. Yet, spite of these sources of vagueness in the subject and its name, some considerable part of the theory can be looked upon as pretty clearly defined, and it may be possible, by means of careful reflection on this ascertainable quantity, to indicate, roughly at least, the extent and boundaries of a complete system of æsthetic doctrine.

A very brief survey of what has been written under the name æsthetics is sufficient to show that it includes, as its first and foremost problem, the determination of the nature and laws of Beauty, including along with the Beautiful, in its narrower signification, its kindred subjects, the Sublime and the Ludicrous. To discover what it is in things which makes them beautiful or ugly, sublime or ludicrous, is one constant factor in the æsthetic problem. Intimately connected with this objective question is the subjective and psychological inquiry into the nature of the feelings and ideas that have beauty for their object. Further, it will be found that all attempts to construct a complete æsthetic theory aim at determining the highest ends of the Fine Arts (which obviously concern themselves largely, if not exclusively, with the Beautiful), and at marking out the distinctions and tracing the dependencies of natural and artistic beauty. All this part of the field of æsthetic inquiry seems fairly agreed on, and it is only when we approach other sides of the Fine Arts that the precise scope of the science appears obscure. But while there is this measure of agreement as to the proper subject matter of æsthetics, we find two diametrically opposed methods of approaching it, which distinctly colour all parts of the doctrine arrived at, and impose different limitations to the boundaries of the subject. The first is the metaphysical or *a priori* method; the second the scientific or empirical method. The one reasons deductively from ultra-scientific conceptions respecting the ultimate nature of the universe and human intelligence, and seeks to explain the phenomena of beauty and art by help of these. The other proceeds inductively from the consideration of these phenomena, as facts capable of being compared, classified, and brought under certain uniformities. At the same time, it must not be supposed that either method is customarily pursued in complete independence of the other. The most subtle exponent of transcendentalism in art appeals to generalisations drawn from the facts of art; nor have the professedly scientific critics often abstained from introducing conceptions and hypotheses of a metaphysical character.

#### (A.) METAPHYSICAL PROBLEMS.

Metaphysical speculation in æsthetics centres about the objective nature of beauty, and arises somewhat in the following manner:—The appreciation of the Beautiful is a mode of perception. In estimating a beautiful landscape or a beautiful statue, the mind perceives the beauty as a property of the object. It is, moreover, a single property; the name beautiful always denoting the same essential thing, whatever this may be. Now we find that it is not a simple property of matter known through one particular class of sensations, as colour; and the question arises, what it really is in itself, whether inherent in and inseparable from matter, or something superior to it, and if so, how revealed through it. The directions of this inquiry have been almost as numerous as the systems of metaphysical thought. On the supposition of a real substance matter, independent



or all intelligence, human or divine, writers have attempted to discover the essential principle which beautifies it. It has been universally considered by metaphysicians that matter in itself is devoid of beauty, if not positively ugly, and the only question arises as to the extraneous principle which imparts beauty to it. This has been conceived either as a simple force distinct from matter, yet setting it in motion, vivifying it, and reducing it to forms, as by *Lévéque*; or as a divine being, whose volition directly invests material objects with all their beautiful aspects, as by *Reid*; or, lastly, as self-existent forms or ideas superinduced upon matter, which are in truth the beauty of objects, as by *Plato* and his modern followers.

In the prevailing German systems of æsthetics, which are based on an ontological idealism, the independent existence of matter has been denied. These writers conceive an absolute Thought or Idea as the ultimate reality, of which matter and consciousness are but the two sides. Matter is conceived as the negative or limiting principle in the action or self-movement of the Absolute. The problem of objective beauty becomes on this hypothesis the determination of the particular mode in which the Beautiful is a manifestation of the supreme thought; for the Good and the True are equally revelations of the Unconditioned, and it is necessary to mark off beauty from these. Various definitions of the Beautiful, based on this mode of conception, may be found in the systems of *Hegel*, *Weisse*, and the *Hegelians*. The second great problem in the metaphysics of æsthetics is to co-ordinate the species of the æsthetic genus, namely, the Beautiful (in its narrow sense), the Ugly, the Sublime, and the Ridiculous. This has been undertaken by the *Hegelians*, and their attempts to construct what they call the dialectics of æsthetics are among the most curious products of metaphysical thought. It being assumed that there is some one ontological process running through every manifestation of the æsthetic Idea, these writers have sought to determine how each of the subaltern notions is related to this process. The last problem in the scheme of metaphysical æsthetics relates to the nature and functions of Art, looked at on one side as a reproduction in altered form of the beauty of Nature, and, on the other, as the conscious product of æsthetic intuition in the human mind. First of all, the arts are appreciated and classified according to the several modes in which they body forth the Idea to our minds. Secondly, since the Absolute may be spoken of as revealing itself to human intelligence, so human intelligence may be looked on as groping through long ages after the Absolute, and thus the historical evolution of art finds its place in a complete metaphysic of æsthetics. In concluding this preliminary sketch of the metaphysical systems, it should be added that they can be adequately estimated and criticised only in connection with the whole systems of thought of which they are organic parts. Within the scope of a purely scientific criticism it is only possible to point out any inconsistencies in the application of these ideas to beauty and art, and to show how much or how little they effect, as hypothetical instruments, in helping us more clearly to understand the phenomena.

#### (B.) SCIENTIFIC PROBLEMS.

In the scientific discussion of æsthetic subjects, the antithesis of subject and object in human cognition is accepted as a phenomenal distinction, without any inquiry into its ontological meaning. Inquirers no longer discuss the essence of beauty, looked on as a transcendental conception above all experience, but seek to determine in what the Beautiful, as a series of phenomena, clearly and visibly consists. Æsthetic speculation becomes, accordingly, more purely psychological. First of all, the unity of beauty is questioned. It is asked whether all objects which appear

beautiful are so because of some one ultimate property, or combination of properties, running through all examples of beauty, or whether they are so called simply because they produce some common pleasurable feeling in the mind. This is a question of induction from facts and consequent definition, lying at the very threshold of æsthetic science. It has been most vigorously disputed by British writers on the subject, and many of them have decided in favour of the plurality and diversity of elements in beauty. Again, it has been asked in which category of our experience, objective or subjective, beauty originates. By some it has been referred to an objective source, whether to sensation, as a direct result of physiological action, as by *Burke*, or to something distinctly perceived by means of sensation, as a certain relation of unity, symmetry, &c., among the parts of an object, its colours, forms, and so on, as probably by *Aristotle*, *Diderot*, *Hogarth*, and most writers. By others the source of beauty has been sought in the inner life of the mind itself, in certain ideas and emotions which have become reflected on external objects by association. This is the doctrine of *Alison*. A third class recognise both of these sources, attributing the effects of beauty partly to the pleasurable effects of external stimulation, partly to the activities of perception, and partly to multitudinous associations of ideas and feelings from past experience. This class includes *Dugald Stewart*, *Professor Bain*, and *Mr Herbert Spencer*. A third question in the general scientific theory of beauty which is closely related to the last and largely determined by it, is the precise nature of the mental faculty or activity concerned in the perception and appreciation of the Beautiful. This, too, has been widely discussed by English writers,—answers to the other two questions frequently appearing as the necessary implications of the solution of this one. By those who affirm that beauty is a simple property or conjunction of properties in external objects, the subjective perception of this property has been regarded either as a unique faculty (the internal sense), or as the rational principle acting in a certain way. By the school of *Alison*, who find the source of beauty in a certain flow of ideas suggested by an object, the perception of the same, as a property of the object, would be explained as the result of inseparable association, producing a kind of momentary delusion. And this same effect of association, in producing an apparent intuition of one simple property, would be made use of by those later writers who resolve the nature of beauty into both objective and subjective elements. It is noticeable, too, that while some writers have treated the appreciation of beauty as purely intellectual, others have confined themselves to the emotional element of pleasure. With respect to the *Ludicrous* and the *Sublime*, as distinguished from the *Beautiful*, there seems to have been a tacit agreement that both of these are unique and single properties, whether originally in the object of sense, or reflected on it from the mind; and various theories have been suggested in explanation of the characteristic effects of these properties on human sensibility and thought.

What strikes one most, perhaps, in these discussions is the vagueness due to the great diversity of conception as to the real extent of the Beautiful—the number of objects it may be supposed to denote. While one class of writers appears to limit the term to the highest and most refined examples of beauty in nature and art, others have looked on it as properly including the lower and more vulgarly recognised instances. There is certainly a great want of definiteness as to the legitimate scope of æsthetic theory. It will be seen, too, how closely this point bears on the question of the relativity of æsthetic impressions, whether there is any form of beauty which pleases universally and necessarily, as *Kant* affirms. The true method of resolving

this difficulty would appear to be to look on æsthetic impressions more as a growth, rising, with the advance of intellectual culture, from the crude enjoyments of sensation to the more refined and subtle delights of the cultivated mind. The problem of the universal and necessary would then resolve itself into an inquiry into a general tendency. It would be asked what kinds of objects, and what elements of sensation, idea, and emotion, tend to become conspicuous in æsthetic pleasures, in proportion as the mind advances in general emotional and intellectual culture. Another defect in nearly all the theories of the Beautiful that have been proposed, refers to the precise relation of the intellectual element in the æsthetic impression. In opposing the narrow view, that the appreciation of beauty is a purely intellectual act, a cold intuition of reason, writers have fallen sometimes into another narrowness, in resolving the whole of the effect into emotional elements, or certain species of pleasure. Unless beauty is, as Hutcheson affirmed, a simple property of objects like colour, the perception of it as objective, which all must allow to be a mental fact, can only be explained by means of certain intellectual activities, by force of which the pleasurable effects come to be referred to such a seemingly simple property. The solution of this point would doubtless be found in a more complete discussion of the perceptive or discriminative and assimilative activities of the intellect which are invariably called into play by complex objects, and which correspond to the attributes of proportion, unity in variety, &c., on which so much stress has been laid by the intuitivists. Not only so, but any theory of æsthetic operations must be incomplete which does not give prominence to those more subtle and exalted intellectual activities that are involved in the imaginative side of æsthetic appreciation, as in detecting the curious half-hidden implications which make up the essence of a refined humour, in constructing those vague yet impressive ideas which enter into our intuition of sublimity and infinity, and even in appreciating such seemingly simple qualities as purity of colour and tone, or the perfectly graduated blending of two adjacent colours. Such activities of the mind constitute, among other things, the symbolic aspect of the Beautiful, and give, as Mr Mill suggests, a basis of truth to such seemingly fanciful notions respecting the meaning of beautiful qualities as one finds in the works of Mr Ruskin.

But comparatively little has been done in a purely scientific manner to determine the nature and functions of Art so as to fix the relations of the different arts to simple or natural beauty. Aristotle supplied a few valuable doctrines, which have been rendered still more precise by Lessing and others. Yet there seems even now no consensus of opinion as to the precise aims of art, how far it has simply to reproduce and constructively vary the beauties of nature, or how far to seek modes of pleasurable effect wider than those supplied by natural objects. A theory of art at all comparable in scientific precision to existing theories of morals has yet to be constructed. The few attempts to establish a basis for art of a non-metaphysical kind are characterised by great one-sidedness. Thus, for example, the theory that the function of art is to imitate nature, has been broached again and again with scarcely any reference to music, merely, as it seems, out of an impatience for some one defining property. Without attempting to sketch a complete doctrine of art, a suggestion may be offered as to the right direction of inquiry. First of all, then, the widest possible generalisations on the various emotional susceptibilities to which art can appeal must be collected, from a study both of mental phenomena as a whole, and of all varieties of pleasurable feeling actually ministered by the several forms of art. This would fix the end of the fine arts in the widest sense, marking it off from the ends

of utility and morality. Secondly, the highest aims of art, or the ideal of art, would have to be determined by a consideration of the laws of compatibility and incompatibility among these various orders of gratification, the requirements of quantity, variety, and harmony, in any lofty æsthetic impression, and the relative value of the sensational, intellectual, and emotional elements in æsthetic effect. This part of the subject would include the discussion of the value and universal necessity of the real and the ideal in art, truth to nature and imaginative transformation. These conclusions would require verification by means of the widest and most accurate study of the development of the arts, in which could be traced the gradual tentative progress of the artistic mind towards the highest achievements of art, as well as the permanent superiority of all those forms of art which most clearly embody this tendency. This part of the theory of art would clearly connect itself with the problem of the general law or tendency in æsthetic development already referred to. The proper determination of these two ideas, the whole range of possible æsthetic delight, and the direction of the highest, purest, and most permanent delight of cultivated minds, would at once dispose of many narrow conceptions of art, by recognising the need of the widest possible diversity and grades of artistic value, if only as experiments requisite to the discovery of its highest function. At the same time the meaning and limits of the universal and necessary in art would be defined, and the unsuggestive and dreary conflicts between an unbending absolutism and a lawless individualism shown to be irrelevant. The validity of canons of art, and their limitations, would in this manner be fixed, and the impatient exaltation of certain schools and directions of taste reduced to a modest assertion of a purely relative truth. The aims of art as a whole being thus determined, the next thing would be to define and classify the individual arts of painting, music, poetry, &c., according to their respective powers of embodying these aims. This would require a careful consideration of the material or medium of expression employed by each art, and the limitations imposed by it as to the mode of representation. The determination of this part of æsthetic theory, which Lessing commenced, would require not only technical but considerable psychological knowledge. Similarly, any conclusion arrived at on this subject would need to be verified by a reference to the history of the arts, as exemplifying both the successes of a right conception of the scope and possibilities of the particular art, and the failures resulting from a mistaken conception. Many other points, such as the nature of genius, the function and bounds of criticism, the relation of æsthetic culture to intellectual, moral, and social progress, would be included in a complete scheme of art doctrine.

### (C.) HISTORY OF SYSTEMS.

In the following brief account of the most important contributions to æsthetic doctrine, only such writings will be recognised as aim at some general conception of Art and the Beautiful. Much that passes in current literature for æsthetic speculation, namely, a certain thoughtful way of criticising special works of art, is simply the application of recognised principles to new cases. Sometimes, however, in the hands of a philosophic critic the mere appreciation of a single poem or the works of a particular artist may become a luminous discussion of some general principle, and this method of constructing æsthetic theory from the criticism of a single work or series of works was rendered very productive by Lessing.

I. *Greek Speculations.*—Ancient Greece supplies us with the first speculations on the Beautiful and the aims of the fine arts. Nor is it surprising that among a people



Socrates.

so productive of noble artistic creations, and at the same time so speculative, numerous attempts to theorise on these subjects should have been made. We have in classic writings many allusions to works of an æsthetic character now lost, such as a series on poetry, harmony, and even painting, by Democritus. It is to be gathered, too, from Plato's Dialogues that the Sophists made the principles of beauty a special department in their teaching. The first Greek thinker, however, whose views on these subjects are at all known is Socrates. Accepting Xenophon's account of his views in the *Memorabilia* and the *Symposium*, we find that he regarded the Beautiful as coincident with the Good, and both of them as resolvable into the Useful. Every beautiful object is so called because it serves some rational end, whether the security or gratification of man. It looks as though Socrates rather disparaged the immediate gratification which a beautiful object affords to perception and contemplation, and emphasised rather its power of furthering the more necessary ends of life. Thus he said that pictures and other purposeless works of art, when used to adorn a house, hindered rather than furthered enjoyment, because of the space they took from useful objects. This mode of estimating the value of beauty is, however, no necessary consequence of the theory that the whole nature of beauty is to minister pleasure. It arises from undue attention to mere material comfort as a condition of happiness. The really valuable point which Socrates distinctly brought to light is the relativity of beauty. Unlike his illustrious disciple, he recognised no self-beauty (αὐτὸ τὸ καλόν) existing absolutely and out of all relation to a perceiving mind.

Plato.

Of the precise views of Plato on this subject, even if they were really formed, it is very difficult to gain a just conception from the Dialogues. In some of these, called by Mr Grote the Dialogues of Research, as the *Hippias Major*, he ventures on no dogmatic theory of Beauty, and several definitions of the Beautiful proposed are rejected as inadequate by the Platonic Socrates. At the same time we may conclude that Plato's mind leaned decidedly to a theory of an absolute Beauty, this, indeed, being but one side of his remarkable scheme of Ideas or self-existing Forms. In the *Symposium* he describes how love (Eros) produces aspiration towards the pure idea of beauty. It is only this absolute beauty, he tells us, which deserves the name of beauty; and this is beautiful in every manner; and the ground of beauty in all things. It is nothing discoverable as an attribute in another thing, whether living being, earth, or heaven; for these are only beautiful things, not the Beautiful itself. It is the eternal and perfect existence contrasted with the oscillations between existence and non-existence in the phenomenal world. In the *Phædrus*, again, he treats the soul's intuition of the self-beautiful as a reminiscence of its pre-natal existence, undefiled by union with the body. With respect to the precise forms in which the idea of beauty reveals itself, Plato is very undecided. Of course his theory of an absolute Beauty is incompatible with the notion of its ministering simply a variety of sensuous pleasure, to which he appears to lean in the *Gorgias* and even the *Hippias Major*. Further, his peculiar system of ideas naturally led him to confuse the self-beautiful with other general conceptions of the true and the good, and so arose the Platonic formula *καλοκἀγαθία*, expressive of the intimate union of the two principles. So far as his writings embody the notion of any distinguishing element in beautiful objects, it is proportion, harmony, or unity among the parts of an object. The superior beauty of proportion is taught in the *Philebus*, and in the *Phædon* it is applied to virtue. As a closely-related view, we see him emphasising unity in its simplest aspect of oneness and purity, the need of variety being over-

looked. Thus in the *Philebus* he states his preference for regular and mathematical forms, as the straight line and the circle. So he selected among colours pure white, among tones the pure and equal, and among impressions of touch the smooth. At the same time the Dialogues evince many other tentative distinctions in the Beautiful, as, for example, the recognition in the *Politics* of two opposed classes of beautiful things, those characterised by force and velocity, and those by a certain slowness and softness; which points to a contrast between the stimulative and the restful in sensation, since enlarged upon by English psychologists. Elsewhere he descants on the beauty of the mind, and seems to think, in the *Republic*, that the highest beauty of proportion is seen in the union of a beautiful mind with a beautiful body. In spite of his lofty theory of the origin and nature of beauty, Plato seems to have imperfectly appreciated the worth of art as an independent end in human life and culture. He found the end of art in imitation (μίμησις), but estimated the creative activity of art as a clever knack, little higher in intellectual value than the tricks of a juggler. He tended to regard the effects of art as devoid of all serious value, and as promoting indolence and the supremacy of the sensual elements of human nature. (See the *Sophistes*, *Gorgias*, and *Republic*.) Accordingly, in his scheme for an ideal republic, he provided for the most inexorable censorship on poets, &c., so as to make art as far as possible a mere instrument of moral and political training. As to particular arts, Plato appears to have allowed a certain ethical value to music, in combination with dance and song, if of a certain character, as expressing either the worthy and manly, or the quiet and orderly. With respect to poetry, his views, as expressed in the *Republic* and elsewhere, were very uncertain. Thus at times he condemns tragedy and comedy *in toto*; at other times he admits the claims of a lofty dramatic poetry. He seems not to have fully considered the aims and influences of painting and sculpture, which he constantly disparages.

A loftier conception of the aims of poetry was afforded Aristotle by the strictures of Aristophanes in the *Frogs* and elsewhere. But the one Greek who, as far as we know, fully appreciated and clearly set forth the ends of the fine arts, considered, independently of ethical and political aims, as the vehicles to the mind of the ideas and delights of beauty, was Aristotle. Unlike Plato, he proceeded less metaphysically and more scientifically to investigate the phenomena of beauty by a careful analysis of the principles of art. In his treatises on poetry and rhetoric, he gives us, along with a theory of these arts, certain principles of beauty in general; and scattered among his other writings we find many valuable suggestions on the same subject. First of all, Aristotle ignores all conceptions of an absolute Beauty, and at the same time seeks to distinguish the Beautiful from the Good. Thus, although in the more popular exposition, the *Rhetoric*, he somewhat incorrectly makes praiseworthiness a distinguishing mark of the Beautiful, regarded as a species of the Agreeable or Desirable, he seeks in the *Metaphysics* to distinguish the Good and the Beautiful thus: the Good is always in action (ἐν πράξει); the Beautiful, however, may exist in motionless things as well (ἐν ἀκίνητοις). Elsewhere he distinctly teaches that the Good and the Beautiful are different (ἕτερον), although the Good, under certain conditions, can be called beautiful. He thus looked on the two spheres as co-ordinate species, having a certain area in common. It should be noticed that the habit of the Greek mind, in estimating the value of moral nobleness and elevation of character by their power of gratifying and impressing a spectator, gave rise to a certain ambiguity in the meaning of τὸ καλόν, which accounts for the prominence the Greek thinkers gave to the connection between the

Beautiful and the Good or morally Worthy. Aristotle further distinguished the Beautiful from the Fit, and in a passage of the *Politics* set Beauty above the Useful and Necessary. Another characteristic of the Beautiful fixed by this thinker in the *Rhetoric* is the absence of all lust or desire in the pleasure it bestows. This is an important point, as suggesting the disinterested and unmonopolising side of æsthetic pleasure. The universal elements of beauty, again, Aristotle finds in the *Metaphysics* to be order (*τάξις*), symmetry, and definiteness or determinateness (*ὁρίσμενον*). In the *Poetics* he adds another essential, namely, a certain magnitude, it being desirable, for a synoptic and single view of the parts, that the object, whether a natural body or a work of art, should not be too large, while clearness of perception requires that it should not be too small. At the same time he seems to think that, provided the whole be visible as such, the greater magnitude of an object is itself an element of beauty. This is probably to be understood by help of a passage in the *Politics*, which lays down the need of a number of beautiful parts or aspects in a highly beautiful object, as the human body. With respect to art, Aristotle's views are an immense advance on those of Plato. He distinctly recognised, in the *Politics* and elsewhere, that its aim is simply to give immediate pleasure, and so it does not need to seek the useful like the mechanical arts. The essence of art, considered as an activity, Aristotle found in imitation, which, unlike Plato, he considers not as an unworthy trick, but as including knowledge and discovery. The celebrated passage in the *Poetics* where he declares poetry to be more philosophic and serious a matter (*σπουδαιότερον*) than philosophy, best shows the contrast between Plato and Aristotle in their estimates of the dignity of artistic labour. In the *Poetics* he tells us that the objects to be imitated by the poet are of three kinds—(1.) Those things or events which have been or still are; (2.) The things which are said to be and seem probable; (3.) The things which necessarily are (*εἶναι δεῖ*). The last points, as Schasler supposes, to the ideal character of imitation as opposed to mere copying of individual objects or events, and accounts for the lofty value assigned to it by Aristotle. More particularly the objects of imitation in poetry and music, if not in all art, are dispositions (*ῥῆθι*), passions, and actions. Aristotle gives us some interesting speculations on the nature of the artist's mind, and distinguishes two varieties of the poetic imagination—the easy and versatile conceptive power of a man of natural genius (*ἐνφυῆς*), and the more emotional and lively temperament of an inspired man (*μανικός*). He gives us no complete classification of the fine arts, and it is doubtful how far his principles are to be taken as applicable to other than the poetic art. He seems, however, to distinguish poetry, music, and dancing—all of which are supposed to imitate some element of human nature, some feeling or action—by the means they employ, namely, rhythm, harmony, melody, and vocal sound. Painting and sculpture are spoken of as imitative arts, but their special aims are not defined. Architecture seems ignored by Aristotle as non-imitative. His peculiar theory of poetry can only be just glanced at here. Its aim, he says, is to imitate dispositions and actions. Metrical form is hardly looked on as an essential. Poetic imitation, as including the selection of the universal in human nature and history, is ably treated; and from this part of Aristotle's theory all modern ideas of poetic truth are more or less derivable. He distinguishes, somewhat superficially, the epic poem, the drama, and a third variety not named, but apparently lyric poetry, by the manner in which the poet speaks in each variety, whether in his own person, or in that of another, or in both alternately. The epic and the dramatic poem require unity of action, a certain magnitude, with

beginning, middle, and end, and also those changes of fortune and recognitions that make up the thrilling character of plot. The end of tragedy Aristotle defines as the effecting, by means of pity and fear, of a purification of these passions; and this is perhaps the point of greatest interest for æsthetics in the whole of his theory of poetry. Whether he is referring to any moral influence of tragedy on the emotions, bringing both fear and pity in the spectator's mind to their proper ethical mean, as Lessing and others conceive; whether he simply means the elimination of all painful ingredients in these feelings, either by the recognition of the imaginary nature of the evil represented, or by the simultaneous satisfaction of other and deeper feelings as moral approval or wide human sympathy; or, finally, whether by "purification" we are to understand the grateful relief by artificial means of a recurring emotion needing periodic vent, as Ueberweg argues,—this subtle point may be left to the student to decide. It would be interesting to know how far Aristotle attributed something analogous to this *κάθαρσις* to the other arts. In the *Politics* he certainly speaks of a purifying effect in certain kinds of music in quieting the wilder forms of excitement. Finally, it might perhaps be conjectured from his definition of the Ludicrous, as something faulty and disgraceful, yet free from pain, and not destructive, that he would find in the laughter of comedy something analogous to this purification, namely, the gradual resolution of the more painful feelings of contempt or disgust into the genial moods of pure hilarity.

Omitting to notice the few valuable remarks on æsthetic subjects of the later Greeks and their Roman contemporaries, one may briefly refer to the views of the Alexandrian mystic and Neo-Platonist Plotinus, not only because of their intrinsic interest, but on account of their resemblance to certain modern systems. His theory is to be found in an essay on the Beautiful in the series of discourses called *Enneades*. His philosophy differs from the Platonic in the recognition of an objective *νοῦς*, the direct emanation from the absolute Good, in which the ideas or notions (*λόγοι*), which are the prototypes of real things, are immanent. This Reason, as self-moving, becomes the formative influence reducing matter, which in itself is dead, to form. Matter thus formed becomes a notion (*λόγος*), and this form is beauty. Objects are ugly so far as they are unacted upon by Reason, and so remain formless. The creative *νοῦς* is absolute Beauty, and is called the more than beautiful (*τὸ ὑπέρεκαλλον*). There are three degrees or stages of the Beautiful in manifestation, namely, the beauty of subjective *νοῦς*, or human reason, which is the highest; that of the human soul, which is less perfect through the connection of the soul with a material body; and that of real objects, which is the lowest manifestation of all. As to the characteristic form of beauty, he supposed, in opposition to Aristotle, that a single thing not divisible into parts might be beautiful through its unity and simplicity. He attached special worth to the beauty of colours in which material darkness is overpowered by light and warmth. In reference to artistic beauty, he said that when the artist has *λογοὶ* as models for his creations, these may become more beautiful than natural objects. This is a very curious divergence of opinion from the Platonic.

After Plotinus there is little speculation on æsthetic subjects till we come to modern writers. St Augustine wrote a treatise on the Beautiful, now lost, in which he appears to have reproduced Platonic ideas under a Christian guise. He taught that unity is the form of all beauty ("omnis porro pulchritudinis forma unitas est"). Infinite goodness, truth, and beauty are the attributes of the Deity, and communicated by him to things. But passing from these fragmentary utterances, we may consider more fully

St Augustine  
Transition  
to modern  
systems.



the modern theories, beginning with the German systems, as being the most metaphysical, and having most affinity with ancient speculation. In German literature the two divisions of metaphysical deduction and critical construction of æsthetic principles are very sharply contrasted, and nearly every writer on the subject is easily referred to one or other of the classes. On the one hand, we have the laborious systematic philosophers, as Kant and Hegel; and on the other, men who entered upon æsthetic speculation either as connoisseurs of some special department, as Winckelmann and Lessing, or even as productive artists—for example, Schiller and Goethe.

Systematic  
treatises:—  
Baumgar-  
ten.

II. *German Writers.*—The first of the Germans who attempted to fit a theory of the Beautiful and of Art into a complete system of philosophy was Baumgarten. Adopting the Wolffian principles of knowledge, as modified by Leibnitz, he thought he was completing that system by setting over against logical knowledge, whose object is truth, æsthetic knowledge, which has to do with beauty. The former is conceptive knowledge (*begreifendes Erkennen*), the art of the understanding, and its result as the science of clear conceptions is embodied in logic. Æsthetic has to do, not with clear, but confused conceptions (*verworrene Vorstellungen*), namely, sensuous knowledge. The beautiful is defined by Baumgarten as the perfection of sensuous knowledge, and the ugly is that which struggles against this perfection; and, consistently with this view, he first employed the term æsthetic (*æsthetica*) to denote a theory of the Beautiful. He held that perfection, as harmony of object with its conception or notion (*Begriff*), presents itself under three aspects:—(1.) As truth for pure knowledge; (2.) As beauty for obscure perception; (3.) As goodness for the capacities of desire or will. It will be seen at once by the thoughtful student that this mode of dealing with impressions of beauty, &c., simply as intellectual elements (confused conceptions), must fail to account for their emotional aspects—feeling, which is the very soul of the æsthetic impression, being radically distinct from conception and knowledge. Still Baumgarten did service in separating so sharply the provinces of logic, ethics, and æsthetics, and in connecting the latter with the impressions of the senses. The details of his æsthetics are mostly unimportant. From Leibnitz's theory of a pre-established harmony, and its consequence that the world is the best possible, Baumgarten concluded that nature is the highest embodiment of beauty, and that art must seek as its highest function the strictest possible imitation of nature. Baumgarten had several disciples in this conception of æsthetics, as Sulzer and Moses Mendelssohn.

Kant

The next original philosophical scheme of æsthetics is that of Kant. His system of knowledge falls into three branches—the critique of pure reason, which has to determine what are the *a priori* elements in the knowledge of objects; the critique of practical reason, which inquires into the *a priori* determinations of the will; and the critique of judgment, which he regards as a connecting link between the other two, and which has to do with any *a priori* principles of emotion (pleasure and pain), as the middle term between cognition and volition. This judgment Kant divides into the æsthetic, when pleasure or pain is felt immediately on presentation of an object; and the teleological, which implies a pre-existing notion, to which the object is expected to conform. He attempts, in a somewhat strained manner, to define the Beautiful by help of his four categories. In *quality* beauty is that which pleases without interest or pleasure in the existence of the object. This distinguishes it from the simply Agreeable and the Good, the former stimulating desire, and the latter giving motive to the will. In *quantity* it is a universal pleasure. Under the aspect of *relation*, the Beautiful

is the form of adaptation (*Zweckmässigkeit*) without any end being conceived. Finally, in *modality* it is a necessary satisfaction, pleasing not by a universal rule, this being unassignable, but by a *sensus communis*, or agreement of taste. Kant is not very consistent in carrying out these distinctions. Thus, for example, he recognises in fitness a particular species of beauty, namely, “adhering” as distinguished from “free” or intrinsic beauty, without recognising that this implies the presence of a notion. So, in discussing the objective validity of our æsthetic impressions, he decides that the highest meaning of beauty is to symbolise moral good; and, in even a more fanciful manner than that of Mr Ruskin, he attaches moral ideas, as modesty, frankness, courage, &c., to the seven primary colours of the Newtonian system. Yet he does not admit that the perception of this symbolic function involves any notion. Once more, he attributes beauty to a single colour or tone by reason of its purity. But such a definition of the form of the Beautiful clearly involves some notion in the percipient mind. Kant further applies his four categories, with still less of fruitful suggestion, to the Sublime. The satisfaction of the Sublime is a kind of negative pleasure created through the feeling of a momentary restraint (*Hemmung*) of vital force, and of a subsequent outpouring of the same in greater intensity. The feeling of the inadequacy of the imagination is succeeded by a consciousness of the superiority of reason to imagination. The sentiment is thus a kind of wonder or awe. Sublimity is either mathematical, that of magnitude, or dynamical, that of nature's might. He allows no sublimity to passions, as rage or revenge. Kant has, too, a theory of the Ridiculous, the effect of which he lays, oddly enough in respect to the rest of his doctrine, in a grateful action of the body, the muscles of the diaphragm, &c., giving a sense of health. This action takes place on the sudden relaxation of the understanding when kept in a state of tension, by expectation. The cause of laughter, or the Ridiculous, may hence be defined as “the sudden transformation of a tense expectation into nothing.” He placed the beauty of nature above that of art, which can be of value only mediately, not as an end in itself. He classifies the arts according as they express the æsthetic idea—whatever this may mean after his exclusion of all definite conception from the perception of beauty. Just as expression in speech consists of articulation, gesticulation, and modulation, answering to thought, intuition (*Anerkennung*), and feeling, so we have three kinds of art—(1.) Those proceeding orally (*redende*), oratory and poetry; (2.) Those of visible image (*bildende*), plastic art and painting; and (3.) “the art of the play of feelings,” namely, music and “colour art,” which last is not defined. Kant's system is very defective, and some of its inconsistencies were pointed out by Herder in his *Kalligone*, who lacked, however, philosophic accuracy. Herder denied Kant's distinctions between the Beautiful, the Good, and the Agreeable, saying that the first must be desired as well as satisfying, and the second be loved as well as prized. Yet herein Kant is decidedly superior to his critic. Herder held, in opposition to Kant, that all beauty includes significance (*Bedeutsamkeit*), and cannot affect us apart from a notion of perfection. But here, too, Kant is to be preferred, since his theory does not assume all beautiful objects to contain some one element or form capable of being detected. Kant's real additions to æsthetic theory consist in the better separation of the Beautiful from the Good and Agreeable, in the prominence given to the emotional side of æsthetic impressions, and in the partial recognition of the relativity of æsthetic judgment, more especially in the case of the Sublime.

After Kant the next philosopher to discuss the meta- Schelling physics of the Beautiful and art is Schelling. He sought

to engraft art upon his curious system of transcendental idealism in a manner which can only be faintly indicated here. In Schelling's metaphysical system the relation of subject and object is conceived as identity. Each exists, yet not independently of the other, but identified in a higher, the absolute. They may be conceived as two poles representing different directions, but yet inseparably joined. All knowledge rests on this agreement. Either nature, the object, may be conceived as the *prius*, and the subject constructed out of it; or the subject may be taken as the *prius*, and the object constructed from it. These are the two poles of knowledge, and constitute the philosophy of nature and the transcendental philosophy. The latter, like Kant's philosophy of mind, is based on a threefold conception of the powers of human nature. It consists of—(1.) Theoretic philosophy, dealing with perception; (2.) Practical philosophy, discussing the will and freedom; and (3.) The philosophy of art. The aim of the last is thus expressed: The *ego* must succeed in actually perceiving the concord of subject and object, which is half disguised in perception and volition. This concord is seen within the limits of the *ego* in artistic perception only. Just as the product of nature is an unconscious product like a conscious one, in its designfulness, so the product of art is a conscious product like an unconscious one. Only in the work of art does intelligence reach a perfect perception of its real self. This is accompanied by a feeling of infinite satisfaction, all mystery being solved. Through the creative activity of the artist the absolute reveals itself in the perfect identity of subject and object. Art is therefore higher than philosophy. Schelling thus sets the beauty of art far above that of nature. As to the form of the beautiful he is very vague, leaning now to a conception of harmony in the totality of the world (*Weltall*), and now to a Platonic conception of primitive forms (*Urbilder*) of perfection. He has a very intricate classification of the arts, based on his antithesis of object and subject, reality and ideality. A curious feature of Schelling's theory is his application of his one fundamental idea to tragedy. The essence of tragedy is, he thinks, an actual conflict of liberty in the subject with objective necessity, in which both being conquered and conquering, appear at once in the perfect indifference. Antique tragedy he holds, accordingly, to be the most perfect composition of all arts.

Passing over Solger, whose æsthetic doctrine is little more than a revival of Platonism, we come to Hegel. His system of philosophy falls into three parts, all based on the self-movement of the idea or absolute:—(1.) The logic discussing the pure universal notions which are the logical evolution of the absolute, as pure thought; (2.) Philosophy of nature—the disruption of thought, the idea, into the particular and external; (3.) Philosophy of the spirit—the return of thought or the absolute from this self-alienation to itself in self-cognisant thought. Just as the absolute, so has spirit a series of three grades to traverse—(a.) Subjective spirit or intelligence, relating itself to the rational object as something given; (b.) Objective spirit or will, which converts the subjectivised theoretical matter (truth) into objectivity; (c.) Absolute spirit, which is the return of the spirit from objectivity to the ideality of cognition, to the perception of the absolute idea. This again has three stages—(1.) Art, in which the absolute is immediately present to sensuous perception; (2.) Religion, which embodies certainty of the idea as above all immediate reality; and (3.) Philosophy, the unity of these. According to this conception, the beautiful is defined as the shining of the idea through a sensuous medium (as colour or tone). 'It is said to have its life in shining or appearance (*Schein*), and so differs from the true, which is not real sensuous existence, but the universal idea

contained in it for thought. He defines the form of the Beautiful as unity of the manifold. The notion (*Begriff*) gives necessity in mutual dependence of parts (unity), while the reality demands the appearance or semblance (*Schein*) of liberty in the parts. He discusses very fully the beauty of nature as immediate unity of notion and reality, and lays great emphasis on the beauty of organic life. But it is in art that, like Schelling, he finds the highest revelation of the Beautiful. Art makes up the deficiencies of natural beauty by bringing the idea into clearer light, by showing the external in its life and spiritual animation. The various forms of art depend on the various combinations of matter and form. In Oriental or symbolical art matter is predominant, and the thought is struggling through with pain so as to reveal the ideal. In the classical form the ideal has attained an adequate existence, form and matter being absolutely commensurate. Lastly, in the romantic form, the matter is reduced to a mere show, and the ideal is supreme. Hegel classifies the individual arts according to this same principle of the relative supremacy of form and matter—(1.) The beginning of art is architecture, in which as a symbolic art the sensuous material is in excess. (2.) Sculpture is less subjected to matter, and, as representing the living body, is a step towards a higher ideality. (3.) Painting, which is the romantic art *κατ' ἐξοχήν*, expresses the full life of the soul. By the elimination of the third dimension of space, and the employment of a coloured plane, painting rids itself of the coarse material substrate of sculpture, and produces only a semblance of materiality. (4.) In music, which employs pure tone, all the elements of space are suppressed, and hence its content is the inner emotional nature (*Gemüth*). Music is the most subjective of the arts. (5.) Poetry has the privilege of universal expression. It contains all the other arts in itself, namely, the plastic art in the epos, music in the ode, and the unity of both in the drama.

Several systems of æsthetics, more or less Hegelian in character, can only be referred to in passing. Weisse defined æsthetics as the science of the idea of beauty, and explained the Beautiful as the entrance of the universal or of the essence into the limited and finite, that is, the cancelling or annulling of truth (*die aufgehobene Wahrheit*). By thus recognising an internal contradiction in all beauty, he sought to develop, by a curious dialectical process, the ideas of the Ugly, the Sublime, and the Ludicrous. He treats each of these three in immediate contrast to beauty. Ugliness is the immediate existence of beauty. It appears as the negative moment in the Sublime, and in the Ludicrous this negativity is again cancelled and resolved into affirmation so as to constitute a return to the Beautiful. A like attempt to determine the relations of the Ugly, Comic, &c., as moments of the self-revealing idea was made by several Hegelians. Thus Ruge, in his *Abhandlung über das Komische*, teaches that sublimity is the æsthetic idea striving to find itself, together with the satisfaction of this striving. If, however, the idea lose itself, sinking away in a kind of swoon, we have the Ugly. Finally, when the idea recovers from the swoon, its new birth is attended with a feeling of amusement (*Erheiterung*), and then we have the effect of the Ludicrous. Rosenkranz, in his *Ästhetik des Hässlichen*, conceives the Ugly as the negation of the Beautiful, or as the middle between the Beautiful and the Ludicrous, and seeks to trace out its various manifestations in formlessness in nature, incorrectness in artistic representation, and deformity or the disorganisation of the Beautiful in caricature. Schasler, again, seems to hold that the Ugly is co-ordinate with the Beautiful, being the motor principle that drives the Beautiful from the unconditioned rest of the Platonic idea, from the sphere of empty abstractness to actuality. This fundamental contradiction reveals itself

Dialectic  
of the  
Hegelians



as the contrast of matter and spirit, rigid motionlessness and motion, and appears in art as the antithesis of the sublime and graceful (*das Anmuthige*), the latter containing the Naïf, the Pretty, and the Ridiculous. Finally, Theodor Vischer seeks to settle these subtle relationships in this manner: He supposes the Sublime to be the sundering of the æsthetic idea and its sensuous image (*Gebild*) from the state of unity constituting the Beautiful, the idea reaching as the infinite over against the finite of the image. The image now resists the sudden rupture, and in asserting itself as a totality in defiance of the idea becomes the Ugly. The Comic, again, is the result of some partial and apparently involuntary recognition of the rights of the idea by the rebellious image. Schasler says, in criticising the views of Vischer, that it is difficult not to be satirical in describing the dialectic artifices to which the idea is here compelled, little suspecting how easily any similar attempt to adjust relations between these ideas, looked at objectively as movements of the supreme idea, may appear equally naïf and funny to a mind not already oppressed with the resisting burden of its own abstractions.

Theodor Vischer, the last of the Hegelians named here, has produced the largest and most laborious system of metaphysical aesthetics, and a brief account of its scope must be given to complete our history of the German systems. He defines aesthetics as the science of the Beautiful. His system falls into three parts: (1.) Metaphysic of the Beautiful; (2.) The Beautiful as one-sided existence—beauty of nature and the human imagination; (3.) The subjective-objective actuality of the Beautiful—Art. The metaphysic again falls into two parts—the theory of simple beauty, and that of the Beautiful in the resistance of its moments (the Sublime and Ridiculous). He defines the Beautiful as “the idea in the form of limited appearance.” His discussions of the various beauties of nature, the organic and inorganic world, are very full and suggestive, and his elaboration of the principles of art (excepting those of music, which he left another to elucidate), is marked by a wide and accurate knowledge. He divides the arts into—(1.) The objective, or eye arts (architecture, sculpture, and painting); (2.) Subjective, or ear arts (music); (3.) Subjective-objective arts, or those of sensuous conception (poetry). He subdivides the first into those of measuring sight (architecture), touching sight (sculpture), and sight proper (painting). Vischer's style is very laboured. His propositions fall into the form of mathematical theorems, and are made exceedingly incomprehensible by the excessive subtleties of his metaphysical nomenclature.

There are several other systems of aesthetics which deserve mention here, but space does not allow of a full account of them. Of these the most important are the theories of Herbart, Schopenhauer, and von Kirchmann. Herbart's views are based on his curious psychological conceptions. He ignores any function in the Beautiful as expressive of the idea, and seeks simply to determine the simplest forms or the elementary judgments of beauty. Schopenhauer's discussions, connecting beauty with his peculiar conception of the universe as volition, are a curious contribution to the subject. As a specimen of his speculations, one may give his definition of tragedy as the representation of the horrible side of life, the scornful dominion of accident, and the inevitable fall of the just and innocent, this containing a significant glimpse into the nature of the world and existence. Von Kirchmann has written a two-volume work on aesthetics, which is interesting as a reaction against the Hegelian method. It professes to be an attempt to base the science on a realistic foundation, and to apply the principles of observation and induction long acted upon in natural science.

The German aesthetic speculations not elaborated into

complete systems are too numerous to be fully represented here. Only a few of the most valuable contributions to the theory will be alluded to. Winckelmann's services to the development of plastic art do not directly concern us. Of his theory of plastic beauty, based exclusively on the principles of Greek sculpture, little requires to be said. He first pointed to the real sources of superiority in antique creations, by emphasising the distinction between natural and ideal beauty, the æsthetic value of contour as an ideal element, the beauty of expression as the manifestation of an elevated soul, and consisting of a noble simplicity and a quiet grandeur. But by too exclusive an attention to Greek art, and indeed to sculpture, his theory, as an attempt to generalise on art, lacks completeness, making little room for the many-sidedness of art, and narrowing it down to one, though an exalted, ideal.

Lessing's services to the scientific theory of art are far greater than those of Winckelmann. He is the first modern who has sought to deduce the special function of an art from a consideration of the means at its disposal. In his *Laokoon* he defines the boundaries of poetry and painting in a manner which has scarcely been improved on since. In slight divergence from Winckelmann, who had said that the representation of crying was excluded from sculpture by the ancients as unworthy of a great soul, Lessing sought to prove that it was prohibited by reason of its incompatibility with the conditions of plastic beauty. He reasoned from the example of the celebrated group, the *Laokoon*. Visible beauty was, he said, the first law of ancient sculpture and painting. These arts, as employing the co-existent and permanent in space, are much more limited than poetry, which employs the transitory and successive impressions of sound. Hence, expression is to poetry what corporeal beauty is to the arts of visible form and colour. The former has to do with actions, the latter with bodies,—that is, objects whose parts co-exist. Poetry can only suggest material objects and visible scenery by means of actions; as for example, when Homer pictures Juno's chariot by a description of its formation piece by piece. Painting and sculpture, again, can only suggest actions by means of bodies. From this it follows that the range of expression in poetry is far greater than in visible art. Just as corporeal beauty loses much of its charm, so the visible Ugly loses much of its repulsiveness by the successive and transient character of the poetic medium. Hence poetry may introduce it, while painting is forbidden to represent it. Even the Disgusting may be skillfully employed in poetry to strengthen the impression of the Horrible or Ridiculous; while painting can only attempt this at its peril, as in Pordenone's Interment of Christ, in which a figure is represented as holding its nose. Visible imitation being immediate and permanent, the painful element cannot be softened and disguised by other and pleasing ingredients (the Languable, &c.), as in poetry. As Schasler says, Lessing's theory hardly makes room for the effects of individuality of character as one aim of pictorial as well as of poetic art. Yet as a broad distinction between the two heterogeneous arts, limiting, on the one hand, pictorial description in poetry, and the representation of the painful, low, and revolting in the arts of vision, it is unassailable, and constitutes a real discovery in aesthetics. Lessing's principles of the drama, as scattered through the critiques of the *Hamburg Dramaturgy*, are for the most part a further elucidation of Aristotelian principles, of great value to the progress of art, but adding comparatively little to the theory. Its conspicuous points are the determination of poetic truth as shadowed forth by Aristotle, and the difference between tragedy and comedy in respect to liberty of invention both of fable and of character; secondly, the reassertion that both fear and pity, and not simply one of

Incomplete German systems. Winckelmann.

Vischer.

Other German systems.

these, are the effects of every tragedy, and that it is false dramatic art to attempt to represent either the sufferings of a perfect martyr, or the actions of some monstrous horror of wickedness, as *Cornelle* and the French school had urged; lastly, the interpretation of Aristotle's purification of the passions as referring to this very fear and pity, and pointing to a certain desirable mean between excessive sensibility and excessive callousness. Schasler says that if Lessing had had an Aristotle to lean on in the *Laokoon* as in the *Dramaturgy*, it would have been more valuable. Others might be disposed to say that if he had been as free from the traditions of authority in the *Dramaturgy* as he was in the *Laokoon*, the former might have contained as much in the way of real discovery as the latter.

Goethe

Schiller

The partial contributions to æsthetics after Lessing need not long detain us. Goethe wrote several tracts on æsthetic topics, as well as many aphorisms. He attempts to mediate between the claims of ideal beauty, as taught by Winckelmann, and the aims of individualisation. Schiller discusses, in a number of disconnected essays and letters, some of the principal questions in the philosophy of art. He looks at art as a side of culture and the forces of human nature, and finds in an æsthetically cultivated soul the reconciliation of the sensual and rational. His letters on æsthetic education (*Ueber die æsthetische Erziehung des Menschen*) are very valuable, and bring out the connection between æsthetic activity and the universal impulse to play (*Spieltrieb*). This impulse is formed from the union of two other impulses—the material (*Stofftrieb*) and the formal (*Formtrieb*)—the former of which seeks to make real the inner thought, the latter to form or fashion this reality. Schiller's thoughts on this topic are cast in a highly metaphysical mould, and he makes no attempt to trace the gradual development of the first crude play of children into the æsthetic pleasures of a cultivated maturity. He fixes as the two conditions of æsthetic growth, moral freedom of the individual and sociability. The philosophic basis of Schiller's speculation is the system of Kant. Another example of this kind of reflective discussion of art by literary men is afforded us in the *Vorschule der Ästhetik* of Jean Paul Richter. This is a rather ambitious discussion of the Sublime and the Ludicrous, and contains much valuable matter on the nature of humour in romantic poetry. Jean Paul is by no means exact or systematic, and his language is highly poetic. His definitions strike one as hasty and inadequate: for example, that the Sublime is the applied Infinite, or that the Ludicrous is the infinitely Small. Other writers of this class, as Wilhelm von Humboldt, the two Schlegels, Gervinus, though they have helped to form juster views of the several kinds of poetry, &c., have contributed little to the general theory of art. F. Schlegel's determination of the principle of romantic poetry as the Interesting, in opposition to the objectivity of antique poetry, may be cited as a good example of this group of speculations.

Jean Paul

Other writers.

Attempts to determine the instinctive or sensational element in beauty.

No account of German æsthetics can be complete without some reference to the attempts recently made by one or two naturalists to determine experimentally the physical conditions and the net sensational element of artistic impression. Of these, the most imposing is the development by Helmholtz of a large part of the laws of musical composition, harmony, tone, modulation, &c., from a simple physical hypothesis as to the complex character of what appear to us as elementary tones. Another interesting experimental inquiry has been instituted by Fechner into the alleged superiority of "the golden section" as a visible proportion. Zeising, the author of this theory, asserts that the most pleasing division of a line, say in a cross, is the golden section, where the smaller division is to the larger as the latter to the sum. Fechner describes in his

contribution *Zur experimentalen Ästhetik* a series of experiments on a large number of different persons, in which he supposes he eliminated all effects of individual association, and decides in favour of the hypothesis. He, however, assumes that this visible form must please primarily, and does not recognise that any constant association growing up in all minds alike would give precisely the same results. Finally, allusion may be made to some ingenious but very forced attempts of Unger and others to discover harmonic and melodious relations among the elementary colours.

III. *French writers on Æsthetics.*—In passing from German to French writers on æsthetic topics we find, as might be expected, much less of metaphysical assumption and a clearer perception of the scientific character of the problem. At the same time, the authors are but few, and their works mostly of a fragmentary character. Passing by the Jesuit André, who sought to rehabilitate Augustin's theory of the Beautiful, we first light on the name of Batteux. In his *Cours de Belles Lettres* (1765) he seeks to determine the aims of art by elucidating the meaning and value of the imitation of nature. He classifies the arts according to the forms of space and time, those of either division being capable of combining among themselves, but not with those of the other. Thus architecture, sculpture, and painting may co-operate in one visible effect; also music, poetry, and the dance. Diderot, again, in the *Encyclopédie*, sought to define beauty by making it to consist in the perception of relations. In his *Essais sur la Peinture* he follows Batteux in extolling naturalness, or fidelity to nature. Another very inadequate theory of beauty was propounded by Père Buffier. He said it is the type of a species which gives Buffier the measure of beauty. A beautiful face, though rare, is nevertheless the model after which the largest number is formed. Not unlike this theory is a doctrine propounded by H. Taine. In his work, *De l'Idéal dans l'Art*, he proceeds in the manner of a botanist to determine a scale of characters in the physical and moral man, according to the embodiment of which a work of art becomes ideal. The degree of universality or importance, and the degree of beneficence or adaptation to the ends of life in a character, give it its measure of æsthetic value, and render the work of art, which seeks to represent it in its purity, an ideal work.

The only elaborated systems of æsthetics in French literature are those constructed by the *spiritualistes*, that is, the philosophic followers of Reid and D. Stewart on the one hand, and the German idealists on the other, who constituted a reaction against the crude sensationalism of the 18th century. They aim at elucidating what they call the higher and spiritual element in æsthetic impressions, and wholly ignore any capability in material substance, or external sensation of affording the peculiar delights of beauty. The lectures of Cousin, entitled *Du Vrai, du Beau, et du Bien*, the *Cours d'Esthétique* of Jouffroy, and the systematic treatise of Lévêque, *La Science du Beau*, are the principal works of this school. The last, as the most elaborate, will afford the student the best insight into this mode of speculation. The system of Lévêque falls into four parts—(1.) The psychological observation and classification of the effects of the Beautiful on human intelligence and sensibility; (2.) The metaphysic of beauty, which determines whether it has a real objective existence, and if so, what is the internal principle or substance of this objective entity; and further seeks to adjust the relations of the Beautiful, the Sublime, the Ugly, and the Ridiculous in relation to this principle; (3.) The application of these psychological and metaphysical principles to the beauty of nature, animate and inanimate, and to that of the Deity; (4.) Their application to the arts. The influence of the

Partial discussions of the problem

The system of the spiritualists

Lévêque



Germans in this mode of systematising is apparent. All the characters of beauty in external objects, as a flower, of which the principal are size, unity and variety of parts, intensity of colour, grace or flexibility, and correspondence to environment, may be summed up as the ideal grandeur and order of the species. These are perceived by reason to be the manifestations of an invisible vital force. Similarly the beauties of inorganic nature are translatable as the grand and orderly displays of an immaterial physical force. Thus all beauty is in its objective essence either spirit or unconscious force acting with fullness and in order. It is curious that Lévêque in this way modifies the strictly spiritual theory of beauty by the admission of an unconscious physical force, equally with spirit or mind, as an objective substratum of the Beautiful. He seeks, however, to assimilate this as nearly as possible to conscious energy, as immaterial and indivisible. The aim of art is to reproduce this beauty of nature in a beautiful manner, and the individual arts may be classified according to the degree of beautiful force or spirit expressed, and the degree of power with which this is interpreted. Accordingly, they are arranged by Lévêque in the same order as by Hegel.

IV. *Italian and Dutch Writers.*—There are a few writers on æsthetic subjects to be found in Italian and Dutch literature, but they have little of original speculation. The Italian, as Pagano and Muratori, follow French and English writers. One Dutch writer, Franz Hemsterhuis (18th century), is worth naming. His philosophic views are an attempt at reconciliation between the sensational and the intuitive systems of knowledge. The only faculty of true knowledge is an internal sense, nevertheless all true knowledge comes through the senses. The soul, desiring immediate and complete knowledge, and being limited by its union with the senses, which are incapable of perfectly simultaneous action, strives to gain the greatest number of the elements of cognition or ideas in the shortest possible time. In proportion as this effort is successful, the knowledge is attended with enjoyment. The highest measure of this delight is given by beauty, wherefore it may be defined as that which affords the largest number of ideas in the shortest time.

V. *English Writers.*—In the æsthetic speculations of English writers, we find still less of metaphysical construction and systematisation than in those of French thinkers. Indeed, it may be said that there is nothing answering to the German conception of æsthetic in our literature. The inquiries of English and Scotch thinkers have been directed for the most part to very definite and strictly scientific problems, such as the psychological processes in the perception of the Beautiful. The more moderate metaphysical impulses of our countrymen have never reached beyond the bare assertion of an objective and independent beauty. Hence we find that the German historians regard these special and limited discussions as so many empirical reflections, wholly devoid of the rational element in true philosophy. Schasler speaks of these essays as "empiristic æsthetics," tending in one direction to raw materialism, in the other, by want of method, never lifting itself above the plane of "an æstheticising dilettantism." English writers are easily divisible into two groups—(1.) Those who lean to the conception of a primitive objective beauty, not resolvable into any simpler ingredients of sensation or simple emotion, which is perceived intuitively either by reason or by some special faculty, an internal sense; (2.) Those who, tracing the genesis of beauty to the union of simple impressions, have been chiefly concerned with a psychological and æsthetic origin and growth of our æsthetic perceptions and emotions.

Lord Shaftesbury is the first of the intuitive writers on

beauty. His views are highly metaphysical and Platonic in character. The Beautiful and the Good are combined in one ideal conception, much as with Plato. Matter in itself is ugly. The order of the world, wherein all beauty really resides, is a spiritual principle, all motion and life being the product of spirit. The principle of beauty is perceived not with the outer senses, but with an internal—that is, the moral—sense (which perceives the Good as well). This perception affords the only true delight, namely, spiritual enjoyment. Shaftesbury distinguishes three grades of the Beautiful, namely, (1.) Inanimate objects, including works of art; (2.) Living forms, which reveal the spiritual formative force; and (3.) The source from which these forms spring, God.

In his *Inquiry into the Original of our Ideas of Beauty and Virtue*, Hutcheson follows many of Shaftesbury's ideas. Yet he distinctly disclaims any independent self-existing beauty in objects apart from percipient minds. "All beauty," he says, "is relative to the sense of some mind perceiving it." The cause of beauty is not any simple sensation from an object, as colour, tone, but a certain order among the parts, or "uniformity amidst variety." The faculty by which this principle is known is an internal sense which is defined as "a passive power of receiving ideas of beauty from all objects in which there is uniformity in variety." Thus Hutcheson seems to have supposed that beauty, though always residing in uniformity in variety as its form, was still something distinct from this, and so in need of a peculiar sense distinct from reason for the appreciation of it. But his meaning on this point is not clear. This faculty is called a sense, because it resembles the external senses in the immediateness of the pleasure it experiences. The perception of beauty, and the delight attending it, are quite as independent of considerations of principles, causes, or usefulness in the object, as the pleasurable sensation of a sweet taste. Further, the effect of a beautiful object is like the impression of our senses in its necessity; a beautiful thing being always, whether we will or no, beautiful. In the second place, this sense is called internal, because the appreciation of beauty is clearly distinct from the ordinary sensibility of the eye and ear, whether emotional or intellectual and discriminative, many persons who possess the latter intact being totally destitute of the former. Another reason is, that in some affairs which have little to do with the external senses, beauty is perceived, as in theorems, universal truths, and general causes. Hutcheson discusses two kinds of beauty—absolute or original, and relative or comparative. The former is independent of all comparison of the beautiful object with another object of which it may be an imitation. The latter is perceived in an object considered as an imitation or resemblance of something else. He distinctly states that "an exact imitation may still be beautiful though the original were entirely devoid of it," but, curiously enough, will not allow that this proves his previous definition of beauty as "uniformity amidst variety" to be too narrow. He seems to conceive that the original sense of beauty may be "varied and overbalanced" with the secondary and subordinate kind. Hutcheson spends a good deal of time in proving the universality of this sense of beauty, by showing that all men, in proportion to the enlargement of their intellectual capacity, are more delighted with uniformity than the contrary. He argues against the supposition that custom and education are sources of our perception of beauty, though he admits that they may enlarge the capacity of our minds to retain and compare, and so may add to the delight of beauty.

The next writer of consequence on the intuitive side is Reid. In the eighth of his *Essays on the Intellectual Powers* he discusses the faculty of taste. He held, on the

The intuitivists.  
Shaftesbury.

ground of common sense, that beauty must exist in objects independently of our minds. As to the nature of the Beautiful, he taught that all beauty resides primarily in the faculties of the mind; intellectual and moral. The beauty which is spread over the face of visible nature is an emanation from this spiritual beauty, and is beautiful because it symbolises and expresses it. Thus the beauty of a plant resides in its perfection for its end, as an expression of the wisdom of its Creator. Reid's theory of beauty is thus purely spiritual.

Sir W. Hamilton. The celebrated *Lectures on Metaphysics* of Sir W. Hamilton do not, unfortunately, contain more than a slight preliminary sketch of the writer's theory of the emotional activities. He defines pleasure, following very closely the theory of Aristotle, as "a reflex of the spontaneous and unimpeded exertion of a power of whose energy we are conscious" (vol. ii. p. 440). And, in perfect agreement with this conception, he divides the various feelings according to the faculties or powers, bodily or mental, of which they are the concomitants. In the scheme thus faintly shadowed forth, the sentiments of Taste are regarded as subserving both the subsidiary and the elaborative faculties in cognition, in other words, the Imagination and the Understanding. The activity of the former corresponds to the element of variety in the beautiful object, while that of the latter is concerned with its unity. A beautiful thing is accordingly defined "as one whose form occupies the Imagination and Understanding in a free and full, and, consequently, in an agreeable activity" (p. 512). In this way, the writer conceives, he comprehends all pre-existing definitions of beauty. He explicitly excludes all other varieties of pleasure, such as the sensuous, from the proper gratification of beauty. The æsthetic sentiment is thus regarded as unique and not resolvable into simpler feelings. Similarly, he denies any proper attribute of beauty to fitness. The essence of the sentiment of sublimity he finds, much in the same way as Kant, in a mingled pleasure and pain; "of pleasure in the consciousness of the strong energy, of pain in the consciousness that this energy is vain." He recognises three forms of Sublimity: those of Extension or space, of Protension or time, and of Intension or power. Finally, he thinks that the Picturesque differs from the Beautiful in appealing simply to the imagination. A picturesque object is one whose parts are so palpably unconnected that the understanding is not stimulated to the perception of unity.

Ruskin. A very like interpretation of beauty, as spiritual and typical of divine attributes, has been given by Mr Ruskin in the second volume of his *Modern Painters*. This part of his work, bearing the title "Of Ideas of Beauty," has a very systematic appearance, but is in fact a singularly desultory series of æsthetic ideas put into a very charming language, and coloured by strong emotion. Mr Ruskin distinguishes between the theoretic faculty concerned in the moral perception and appreciation of ideas of beauty and the imaginative or artistic faculty, which is employed in regarding in a certain way and combining the ideas received from external nature. The former, he thinks, is wrongly named the *æsthetic* faculty, as though it were a mere operation of sense. The object of the faculty is beauty, which Mr Ruskin divides into typical and vital beauty. The former is the external quality of bodies that typifies some divine attribute. The latter consists in "the appearance of felicitous fulfilment of function in living things." The forms of typical beauty are—(1.) Infinity, the type of the divine incomprehensibility; (2.) Unity, the type of the divine comprehensiveness; (3.) Repose, the type of the divine permanence; (4.) Symmetry, the type of the divine justice; (5.) Purity, the type of the divine energy; and (6.) Moderation, the type of government by law. Vital beauty, again, is regarded as relative when the degree of

exaltation of the function is estimated, or generic if only the degree of conformity of an individual to the appointed functions of the species is taken into account. Mr Ruskin's wide knowledge and fine æsthetic perception make his works replete with valuable suggestions, though he appears wanting in scientific accuracy, and lacks, as Mr Mill has pointed out, all appreciation of the explanatory power of association with respect to the ideal elements of typical beauty.

Of the more analytic writers on the effects of the Beautiful, The analytical theory of Addison. Addison deserves a passing mention, less, however, for the scientific precision of his definitions, than for the charm of his style. His *Essays on the Imagination*, contributed to the *Spectator*, are admirable specimens of popular æsthetic reflection. Addison means by the pleasures of imagination those which arise originally from sight, and he divides them into two classes—(1.) Primary pleasures, which entirely proceed from objects before our eyes; and (2.) Secondary pleasures, flowing from ideas of visible objects. The original sources of pleasure in visible objects are greatness, novelty, and beauty. This, it may be said, is a valuable distinction, as pointing to the plurality of sources in the æsthetic impression, but the threefold division is only a very rough tentative, and destitute of all logical value, novelty of impression being always a condition of beauty. The secondary pleasures, he rightly remarks, are rendered far more extended than the original by the addition of the proper enjoyment of resemblance, which is at the basis of all mimicry and wit. Addison recognises, too, the effects of association in the suggestion of whole scenes, and their accompaniments by some single circumstance. He has some curious hints as to the physiological seat of these mental processes, and seeks, somewhat naively, to connect these pleasures with teleological considerations.

In the *Elements of Criticism* of Lord Kaimes, another Lord attempt is made to affiliate æsthetic phenomena to simpler pleasures of experience. Beauty and ugliness are simply the pleasant and the unpleasant in the higher senses of sight and hearing. By "higher" he means more intellectual, and he conceives these two senses to be placed midway between the lower senses and the understanding. He appears to admit no more general feature in beautiful objects than this pleasurable quality. Like Hutcheson, he divides beauty into intrinsic and relative, but understands by the latter ideas of fitness and utility, which were excluded from the Beautiful by Hutcheson. He illustrates the English tendency to connect mental processes with physiological conditions, by referring the main elements of the feeling of sublimity to the effect of height in objects in compelling the spectator to stand on tiptoe, by which the chest is expanded and muscular movements produced which give rise to the peculiar emotion.

Passing by the name of Sir Joshua Reynolds, whose Hogarth. theory of beauty closely resembles that of Père Buffier, we come to the speculations of another artist and painter, Hogarth. He discusses in his *Analysis of Beauty* all the elements of visible beauty, both form and colour, often manifesting great speculative skill, and always showing a wide and accurate knowledge of art. He finds altogether six elements in beauty, namely—(1.) Fitness of the parts to some design, as of the limbs for support and movement; (2.) Variety in as many ways as possible, thus in form, length, and direction of line, shape, and magnitude of figure, &c.; (3.) Uniformity, regularity, or symmetry, which is only beautiful when it helps to preserve the character of fitness; (4.) Simplicity or distinctness, which gives pleasure not in itself, but through its enabling the eye to enjoy variety with ease; (5.) Intricacy, which provides employment for our active energies, ever eager for pursuit, and leads the eye "a wanton kind of chase"; (6.) Quantity



or magnitude, which draws our attention, and produces admiration and awe. The beauty of proportion he very acutely resolves into the needs of fitness. Hogarth applies these principles to the determination of degrees of beauty in lines, and figures, and compositions of forms. Among lines he singles out for special honour the serpentine (formed by drawing a line once round from the base to the apex of a long slender cone) as the line of grace or beauty *par excellence*. Its superiority he places in its many varieties of direction or curvature, though he adds that more suddenly curving lines displease by their grossness, while straighter lines appear lean and poor. In this last remark Hogarth tacitly allows another principle in graceful line, namely, gentleness, as opposed to suddenness, of change in direction, though he does not give it distinct recognition in his theory, as Burke did. Hogarth's opinions are of great value as a set off against the extreme views of Alison and the association school, since he distinctly attributes a great part of the effects of beauty in form, as in colour, to the satisfaction of primitive susceptibilities of the mind, though he had not the requisite psychological knowledge to reduce them to their simplest expression. In his remarks on intricacy he shows clearly enough that he understood the pleasures of movement to be involved in all visual perception of form.

Burke. Burke's speculations on the Beautiful, in his *Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful*, are curious as introducing physiological considerations into the explanation of the feelings of beauty. They illustrate, moreover, the tendency of English writers to treat the problem as a psychological one. He finds the elements of beauty to be—(1.) Smallness of size; (2.) Smoothness of surface; (3.) Gradual variation of direction of outline, by which he means gentle curves; (4.) Delicacy, or the appearance of fragility; (5.) Brightness, purity, and softness of colour. The Sublime he resolves, not very carefully, into astonishment, which he thinks always contains an element of terror. Thus "infinity has a tendency to fill the mind with a delightful horror." Burke seeks what he calls "efficient causes" for these phenomena in certain affections of the nerves of sight, which he compares with the operations of taste, smell, and touch. Terror produces "an unnatural tension and certain violent emotions of the nerves," hence any objects of sight which produce this tension awaken the feeling of the Sublime, which is a kind of terror. Beautiful objects affect the nerves of sight just as smooth surfaces the nerves of touch, sweet tastes and odours the corresponding nerve fibres, namely, by relaxing them, and so producing a soothing effect on the mind. The arbitrariness and narrowness of this theory, looked at as a complete explanation of beauty, cannot well escape the reader's attention.

Alison. Alison, in his well-known *Essays on the Nature and Principles of Taste*, proceeds on an exactly opposite method to that of Hogarth and Burke. He considers and seeks to analyse the mental process which goes on when we experience the emotion of beauty or sublimity. He finds that this consists in a peculiar operation of the imagination, namely, the flow of a train of ideas through the mind, which ideas are not arbitrarily determined, but always correspond to some simple affection or emotion (as cheerfulness, sadness, awe), awakened by the object. He thus makes association the sole source of the Beautiful, and denies any such attribute to the simple impressions of the senses. His exposition, which is very extensive, contains many ingenious and valuable contributions to the ideal or association side of æsthetic effects, both of nature and of art; but his total exclusion of delight (by which name he distinguishes æsthetic pleasure) from the immediate effects of colour, visible form, and tone, makes his theory appear very

incomplete. This is especially applicable to music, where the delight of mere sensation is perhaps most conspicuous. He fails, too, to see that in the emotional harmony of the ideas, which, according to his view, make up an impression of beauty, there is a distinct source of pleasure over and above that supplied by the simple feeling and by the ideas themselves.

Jeffrey's *Essay on Beauty* is little more than a modification of Alison's views. He defines the sense of beauty as consisting in the suggestion of agreeable and interesting sensations previously experienced by means of our various pleasurable sensibilities. He thus retains the necessity of ideal suggestion, but at the same time discards the supposed requirement of a train of ideas. Jeffrey distinctly saw that this theory excludes the hypothesis of an independent beauty inherent in objects. He fails as completely as Alison to disprove the existence of a sensuous or organic beautiful, and, like him, is avowedly concerned to show the presence of some one, and only one, determining principle in all forms of the Beautiful.

D. Stewart's chief merit in the æsthetic discussions, contained in his *Philosophical Essays*, consists in pointing out this unwarranted assumption of some single quality (other than that of producing a certain refined pleasure) running through all beautiful objects, and constituting the essence of beauty. He shows very ingeniously how the successive transitions and generalisations in the meaning of the term beauty may have arisen. He thinks it must originally have connoted the pleasure of colour, which he recognises as primitive. His criticisms on the one-sided schemes of other writers, as Burke and Alison, are very able, though he himself hardly attempts any complete theory of beauty. His conception of the Sublime, suggested by the etymology of the word, renders prominent the element of height in objects, which he conceives as an upward direction of motion, and which operates on the mind as an exhibition of power, namely, triumph over gravity.

Of the association psychologists James Mill did little more towards the analysis of the sentiments of beauty than re-state Alison's doctrine. On the other hand, Professor Bain, in his treatise *The Emotions and the Will*, carries this examination considerably further. He asserts with Stewart that no one generalisation will comprehend all varieties of beautiful objects. He thinks, however, that the æsthetic emotions, those involved in the fine arts, may be roughly circumscribed and marked off from other modes of enjoyment by means of three characteristics—(1.) Their not serving to keep up existence, but being gratifications sought for themselves only; (2.) Their purity from all repulsive ingredients; (3.) Their eminently sympathetic or sharable nature in contrast to the exclusive pleasures of the individual in eating, &c. The pleasures of art are divided, according to Mr Bain's general plan of the mind, into (1.) The elements of sensation—sights and sounds; (2.) The extension of these by intellectual revival—ideal suggestions of muscular impression, touch, odour, and other pleasurable sensations; (3.) The revival, in ideal form also, of pleasurable emotions, as tenderness and power, and in a softened measure of emotions painful in reality, as fear; (4.) The immediate gratification, that is in actual form, of certain wide emotional susceptibilities reaching beyond art, namely, the elating effect of all change of impression under the forms of artistic contrast and variety; and, secondly, the peculiar delight springing from harmony among impressions and feelings, under its several æsthetic aspects, musical harmony and melody, proportion, &c. The details in Mr Bain's exposition are rich and varied in relation to the psychology of the subject. He finds the effect of sublimity in the manifestation of superior power in its highest degrees, which manifestation excites a sympathetic

elation in the beholder. The Ludicrous, again, is defined by Mr Bain, improving on Aristotle and Hobbes, as the degradation of something possessing dignity in circumstances that excite no other strong emotion. The pleasure accompanying the impression may be referred either to the elation of a sense of power or superiority ideally or sympathetically excited, or to a sense of freedom from restraint, both of which have in common the element of a joyous rebound from pressure. Thus it will be seen that Professor Bain recognises no new mental principle in æsthetic effects, but regards them as peculiar combinations and transformations, according to known psychological laws, of other and simpler feelings.

Herbert  
Spencer.

An interesting turn has been given to the psychology of æsthetics by Mr Herbert Spencer. In some of his essays, as the one entitled "The Origin and Function of Music," and more fully in the concluding chapter of his *Psychology* (second edition), on the *Æsthetic Sentiments*, he offers a new theory of the genesis of the pleasures of beauty and art, based on his doctrine of evolution. He takes up Schiller's idea of the connection between æsthetic activity and play, only he deals with this latter not as an ideal tendency, but as a phenomenal reality, seeking to make it the actual starting-point in the order of evolution of æsthetic action. Play or sport is defined as the superfluous and useless exercise of faculties that have been quiescent for a time, and have in this way become so ready to discharge as to relieve themselves by *simulated* actions. *Æsthetic* activities yield to the higher powers of perception and emotion the substituted exercise which play yields to the lower impulses, agreeing with play in not directly subserving any processes conducive to life, but being gratifications sought for themselves only. This point of affinity between the two classes of pleasures is a valuable addition to æsthetic theory, and helps one to understand how the artistic impulse first arose. At the same time it is doubtful how far all present æsthetic pleasures, as the passive enjoyments of colour and tone, can be interpreted as substituted activities in Mr Spencer's sense. They seem rather to be original and instinctive modes of gratification not dependent on any previous exercises of life-function, except so far as the structure and functions of the senses as a whole may be viewed as the product of multitudinous life-processes in animal evolution. Mr Spencer, moreover, forms a hierarchy of æsthetic pleasures, the standard of height being either the number of powers duly exercised, or what comes to the same thing, the degree of complexity of the emotional faculty thus exercised. The first, and lowest class of pleasures, are those of simple sensation, as tone and colour, which are partly organic and partly the results of association. The second class are the pleasures of perception, as employed upon the combination of colours, &c. The highest order of pleasures are those of the æsthetic sentiments proper, consisting of the multitudinous emotions ideally excited by æsthetic objects, natural and artistic. Among these vaguely and partially revived emotions Mr Spencer reckons not only those of the individual, but also many of the constant feelings of the race. Thus he would attribute the vagueness and apparent depth of musical emotion to associations with vocal tones, built up during the course of vast ages. This graduated scheme is evidently dictated by the assumption that the higher the stage of evolution, the higher the pleasure. Yet Mr Spencer admits that this measure of æsthetic value will not suffice alone, and he adds, that the most perfect form of æsthetic gratification is realised when sensation, perception, and emotion, are present in fullest and most pleasurable action. Mr Spencer's supposition, that much of the pleasure of æsthetic emotion is referable to transmitted experience, offers a

very ingenious, even if not very definite, mode of explaining many of the mysterious effects of tone, and even of colour.

Among works on the history of æsthetic doctrines, the student may be referred to the following:—

In German literature, which contains the most complete histories, Max Schasler's *Kritische Geschichte der Ästhetik*, forming the first two volumes of an æsthetic system, is the fullest. Still he hardly does justice to English writers, there being no mention of Alison and recent thinkers. His stand-point is only definable as a new modification of Hegelianism. Zimmermann's *Geschichte der Ästhetik* is also to be recommended. Lotze's *Geschichte der Ästhetik in Deutschland* is a highly critical résumé of German systems, characterised by a good deal of caution, and a desire to mediate between opposing views, and if not very definite in its result, very appreciative and suggestive of the many-sidedness of the subject. In French, Lévêque's work, *La Science du Beau*, contains a very fair account of the most conspicuous systems, ancient and modern. In our own literature, numerous references to other systems are to be found in the essays of Alison; and Jeffrey attempts a brief historical survey of the doctrines of beauty in his article on the subject. Dugald Stewart's essays mostly fall into critical examination of the chief theories of beauty. Finally, Professor Bain, in his *Compendium of Mental and Moral Science*, supplies a brief but careful account of most of the known theories of the Beautiful. (J. S.)

**AETION**, a painter, whose famous picture of the marriage of Roxana and Alexander was exhibited at the Olympic games, and gained Aëtion so much reputation that the president of the games gave him his daughter in marriage. The picture is minutely described by Lucian. Aëtion appears from that author to have flourished in the times of Hadrian and the Antonines.

**AETIUS**, a Roman general of the closing period of the western empire, born at Dorostolus in Moesia, late in the 4th century. While detained for some time as a hostage in the camp of Rhuas, king of the Huns, he acquired an influence with the barbarians that was afterwards of much advantage to himself, though the same cannot be said of it as regards the empire. He led into Italy an army of 60,000 Huns, which he employed first to support the usurping Emperor John, and, on the death of the latter, to enforce his claim to the supreme command of the army in Gaul upon Placidia, the empress-mother and regent for Valentinian III. Afterwards, when he incurred the disfavour of Placidia for the death of his rival Boniface, he again employed an army of Huns to compel her to reinstate him in his former position. In Gaul he won his military reputation, upholding for nearly twenty years, by combined policy and daring, the falling fortunes of the western empire. His greatest victory was that of Chalons-sur-Marne (20th Sept. 451), in which he utterly routed Attila and the Huns—the number slain on both sides being, according to one computation, 300,000, though this is obviously an exaggeration. This was the last triumph of the empire. Three years later (454) Aëtius presented himself at court to claim the emperor's daughter in marriage for his son Gaudentius; but Valentinian, suspecting him of designs upon the crown, slew him with his own hand.

**AETIUS**, surnamed "the Atheist," founder of an extreme sect of the Arians, was a native of Coele-Syria. After working for some time as a coppersmith, he became a travelling doctor, and displayed great skill in disquisitions on medical subjects; but his controversial power soon found a wider field for its exercise in the great theological question of the time. He studied successively under the Arians, Paulinus, bishop of Antioch, Athanasius, bishop of Anazarbus, and the presbyter Antonius of Tarsus. In 350 he was ordained a deacon by Leontius of Antioch, but was shortly afterwards forced by the orthodox party to leave that town. At the first synod of Sirmium, he won a dialectic victory over the homoiousian bishops Basilus and Eustathius, who sought in consequence to stir up against him the enmity of Cæsar Gallus. In 356 he went to



Alexandria with Eunomius in order to advocate Arianism, but he was banished by Constantius. Julian the apostate recalled him from exile, bestowed upon him an estate in Lesbos, and retained him for a time at his court in Constantinople. Being consecrated a bishop, he used his office in the interests of Arianism by creating other bishops of that party. At the accession of Valens (364) he retired to his estate at Lesbos, but soon returned to Constantinople, where he died in 367. The Anomecan sect of the Arians, of whom he was the leader, are sometimes called after him *Ætians*. His work *De Fide* has been preserved in connection with a refutation written by Epiphanius.

AETIUS, a Greek physician, born at Amida in Mesopotamia, who lived at the end of the 5th or the beginning of the 6th century. Of his personal history little is known, except that he studied at Alexandria, and was physician to the court at Constantinople with the title *comes obsequii*. He wrote a work entitled *Βιβλία Ἰατρικὰ Ἑκατάδευκα*, which is mainly a compilation from the works of previous authors. Eight books of this were issued from the Aldine press at Venice in 1534; various other parts have been frequently published; and a Latin translation of the whole, by Cornarius, appeared at Basle in 1542.

ÆTNA. See ERNA.

ÆTOLIA, a country of ancient Greece, bounded on the N. by Epirus and Thessaly, on the E. by the provinces of Doris and Locris, on the S. by the Gulf of Corinth, and separated on the W. from Acarnania by the river Achelous. The part which lay westward of the river Evenus, and south of a line joining Thermum and Stratus in Acarnania, was called old Ætolia, the rest of the country new or acquired Ætolia. The country is in general mountainous and woody, but along the coast from the Achelous to the Evenus, and northward to Mount Aracynthus, is a plain of great fertility; while another extensive and fertile plain stretches north from this mountain along the east bank of the Achelous as far as the northern limit of old Ætolia. The Ætoliens were a restless and turbulent people, strangers to friendship or principles of honour, and they were consequently regarded by the other states of Greece as outlaws and public robbers. On the other hand, they were bold and enterprising in war, undaunted in the greatest dangers, and jealous defenders of their liberties. They distinguished themselves above all the other nations of Greece in opposing the ambitious designs of the Macedonian princes, who, after having reduced most of the other states, were forced to grant them a peace upon very honourable terms. The constitution of the Ætolian league was copied from that of the Achæans, and with a view to form, as it were, a counter alliance. The Cleomeneic war, and that of the allies, called the Social War, were kindled by the Ætoliens with the express purpose of humbling the Achæans. In the latter they held out, with the assistance only of the Eleans and Lacedæmonians, for the space of three years, against the united forces of Achæa and Macedon, but were obliged at last to purchase a peace by yielding up to Philip all Acarnania. In order to regain this province they entered into an alliance with Rome against Philip, and proved of great service to the Romans in their war with him; but being dissatisfied with the terms of peace granted by Flaminius, they made war upon the Romans themselves. They were speedily overcome, and only obtained peace on very humiliating terms. After the conquest of Macedon by Æmilius Paulus the Ætoliens were reduced to a much worse condition; for not only those among them who had openly declared for Perseus, but those who were only suspected to have secretly favoured him, were sent to Rome to clear themselves before the senate. There they were detained, and never afterwards permitted to return to their native country.

Five hundred and fifty of the chief men were barbarously assassinated by the partisans of Rome solely on the suspicion of favouring the designs of Perseus. The Ætoliens appeared before Æmilius Paulus in mourning habits, and made loud complaints of such inhuman treatment, but could obtain no redress; on the contrary, ten commissioners, who had been sent by the senate to settle the affairs of Greece, enacted a decree, declaring that those who were killed had suffered justly, since it appeared to them that they had favoured the Macedonian party. From this time those only were raised to the chief honours and employments in the Ætolian republic who were known to prefer the interest of Rome to that of their country, and thus all the magistrates of Ætolia became the creatures and mere tools of the Roman senate. In this state of servile subjection they continued till the destruction of Corinth and the dissolution of the Achæan league, when Ætolia, with the other free states of Greece, was reduced to a Roman province, commonly called the *province of Achæa*. In this state, with little alteration, Ætolia continued under the emperors till the reign of Constantine the Great, who, in his new partition of the provinces of the empire, divided the western parts of Greece from the rest, calling them *New Epirus*, and subjecting the whole country to the *praefectus pratorio* for Illyricum. Under the successors of Constantine Greece was parcelled out into several principalities, especially after the taking of Constantinople by the western princes. About the beginning of the 13th century Theodorus Angelus, a noble Grecian of the imperial family, seized on Ætolia and Epirus. The former he left to Michael his son, who maintained it against Michael Palæologus, the first emperor of the Greeks, after the expulsion of the Latins. Charles, the last prince of this family, dying in 1430 without lawful issue, bequeathed Ætolia to his brother's son, named also Charles; and Acarnania to his natural sons Memnon, Turnus, and Hercules. But great disputes arising about this division, Amurath II., after the reduction of Thessalonica, laid hold of so favourable an opportunity, and expelled all the contending heirs in 1432. The Mahometans were afterwards dispossessed of this country by the famous prince of Epirus, George Castriot, commonly called Scanderbeg, who with a small army opposed the whole power of the Ottoman empire, and was victorious in twenty-two pitched battles. That hero at his death left great part of Ætolia to the Venetians; but they not being able to make head against such a mighty power, the whole country was soon reduced by Mahommed II. It is now included in the kingdom of Greece.

AFANASIEF, ALEKSANDRE NIKOLAEVICH, a Russian scholar, distinguished for his researches in Slavonic literature and archaeology, was born about 1825. He contributed many valuable articles to the serial literature of his country, but his reputation rests chiefly on two works of more permanent interest. The first was an extensive collection, in eight parts, of *Russian Popular Stories*; the other a treatise, in three volumes, on the *Poetical Views of the Old Slavonians about Nature*, completed just before the author's death, which occurred in the autumn of 1871.

AFER, DOMITIUS, orator, born at Nismes, flourished under Tiberius and the three succeeding emperors. Quintilian makes frequent mention of him, and commends his pleadings. But he disgraced his talents by acting as public accuser in behalf of the emperors against some of the most distinguished personages in Rome. Quintilian, in his youth, assiduously cultivated the friendship of Domitius. He tells us that his pleadings were superior in point of eloquence to any he had ever heard, and that there were public collections of his witty sayings (*dicta*), some of which he quotes. He also mentions two books of his, *On*

became a soldier in 1831, and served in Spain, Algiers, the Crimea and Italy. He was with the expedition to Mexico in 1862, and was put in command of the army in 1863. He was made commander-in-chief of the Imperial Guard in 1869. He commanded a corps near Metz at the outbreak of the Franco-Prussian war, and on the eve of the retreat of August, 1870, he took command of the main armies of France. After the defeat at Gravelotte he retired again to Metz, where he capitulated, surrendering his entire force of 173,000 men. For this he was court-martialed in 1873, and sentenced to death, which was commuted to imprisonment for twenty years. In 1874 he escaped from the Isle Ste. Marguerite, and succeeded in reaching Madrid. In 1883 he published a book in justification of himself.

**BAZALGETTE**, SIR JOSEPH WILLIAM, an English civil engineer of French descent, born in 1819. He won fame by constructing sewers, altering streets, and making river embankments. He was engineer-in-chief of the metropolitan board of works in London. He introduced a method of working underground in the laying of water and gas pipes, thus avoiding the tearing up of pavements.

**BAZANCOURT**, CÉSAR DE, baron, a French writer, born in 1810, died Jan. 25, 1865. Louis Philippe made him director of the library of Compiègne, and under Napoleon III he held the office of historiographer. He wrote histories of the Crimean, Italian, Chinese and Cochinchinese wars of Napoleon III, besides a *History of Sicily Under the Norman Rule*.

**BAZARDJIK**, a Bulgarian town which holds an important fair in April. Tatar Bazardjik, a town of Eastern Roumelia, 23 miles west of Philippopolis. It has warm baths.

**BAZEILLES**, a village of France on the right bank of the Meuse River, 4 miles southeast of Sedan. September 1, 1870, the day of the battle of Sedan, it was burned by the Bavarians, but it has since been rebuilt.

**BAZIN**, ANAIS DE RANCOUT, French lawyer and historian, born at Paris in 1797, died in 1850. He wrote *History of France Under Louis XIII*.

**BAZIN**, ANTOINE PIERRE ERNEST, a French physician, the descendant of a long line of medical practitioners, was born at St. Brice, Feb. 20, 1807. He has written much on skin diseases, and in 1847 became physician and professor of dermatology in the St. Louis hospital of Paris.

**BAZIN**, ANTOINE PIERRE LOUIS, brother of the preceding, born March 26, 1799, died in January, 1863. He was a translator of many Chinese works, a professor of the Chinese language, and author of a grammar of the Mandarin dialect.

**BAZLEY**, SIR THOMAS, Bart., an English manufacturer and politician, born at Gilnow, Lancashire, England, in 1797. In 1826 he employed over 1,000 persons at Manchester in the making of fine cotton and lace thread. He established free schools and lectures for his employes. He entered Parliament in 1858, where he was known as a free-trader and anti-corn-law man.

**BAZOCHE**, or BASOCHE. When the French parliament began to administer justice, and ceased to be the grand council of the king (about the fourteenth century), those noblemen who formed the royal train were called *courtiers*, and those who attended on the sittings of the French parliament took the name of *basochians*, or parliament clerks. The latter, in the spirit of fun, chose a king, chancellor, and other officers from their own number; but Henry III would not allow of a mock king, and suppressed that office, but exalted that of chancellor. This mock court held meetings for the admin-

istration of justice, circulated a kind of currency, and had many ridiculous rites and ceremonies. They began the performance of farces, which even the king sometimes attended. These farces were the beginning of French comedy.

**BEACH**, MOSES YALE, an eminent American inventor and publisher, born at Wallingford, Conn., in 1800, died in 1868. He was long connected financially with the New York "Sun," and is regarded as the originator of the American one-cent newspaper. He invented the rag-cutting machine now generally used in the making of paper, and was much interested in experiments on machines for propelling balloons.

**BEACH PLUM** (*Prunus maritima*), a straggling bush found growing along the Atlantic coast of the United States. It bears a red or purple fruit, which is somewhat like the cultivated plum, and which is eaten either fresh or preserved.

**BEACON**, any signal set upon a height, but especially the alarm-fires at one time used to spread the intelligence of foreign invasion or other great events. Fire signals were in use in the earliest times, and notices of them are found in the literature of ancient Persia, Palestine and Greece. They were made by kindling a pile of wood on the tops of lofty mountains, and keeping the flame bright by night, or having the fire so covered as to emit a dense smoke by day.

**BEACON**, in maritime affairs a signal of warning against dangers, or for indicating the proper entrance into a channel, harbor or river. In recent times the construction of floating beacons has occupied a good deal of attention, as it is thought that in many cases they might supply the place of costly light-houses.

**BEACONSFIELD**, BENJAMIN DISRAELI, EARL OF. See DISRAELI, BENJAMIN, in these Revisions and Additions.

**BEAD**, in architecture, a small round molding, sometimes termed an astragal. It occurs mainly among the classical styles, and is used in picture frames and other articles carved in wood.

**BEADLE**, an inferior parish officer in England, chosen and appointed by the vestry. His duty is to attend the vestry, to give notice of its meetings to the parishioners, to execute its orders, to assist the parish constable, and generally to do the business of the vestry and of the parish as their messenger or servant.

**BEADS**, ST. CUTHBERT's, a title popularly given to the single joints of the articulated stems of encrinurites. The central perforation permitted them to be strung as beads, and from the fancied resemblance, in some species, of this perforation to a cross, they were formerly used as rosaries and associated with the name of St. Cuthbert. They are also known as entochites and wheelstones.

**BEAGLE**, a small variety of hound, sometimes used for hare-hunting. It has now been almost wholly superseded by the harrier, to which its name is sometimes given. The true beagle is smaller than the harrier, not above 10 or 11 inches in height at the shoulder, of stout and compact make, with long pendulous ears. It is remarkable for its exquisite scent and perseverance. The beagle gives utterance to a cry which has been regarded as particularly musical. The smallest are sometimes called LAD-DOG BEAGLES.

**BEAKER**, formerly the name of a drinking cup or bowl, but now applied to a vessel made of very thin glass, having a flat bottom, perpendicular sides, and a lip for pouring, and used in laboratories for making chemical solutions.

**BEALE**, LIONEL SMITH, an English physician and physiologist, born at London in 1828. His medical



writings, including works on microscopy, kidney diseases, urinary deposits, the distribution of nerves to voluntary muscle, and the structure and growth of the tissues, are important; and his *Protoplasm, Life Theories, Life and Vital Action, and Principles and Practice of Medicine in Slight Ailments*, are standard works.

**BEAM**, of a ship, one of the main timbers which assist to support the decks. They reach across from side to side, not only strengthening the decks, but also helping to uphold the sides of the hull, being themselves supported at the ends by massive pieces, called knees, standards and clamps.

**BEAM TREE**, **WHITE**, a tree from 20 to 40 feet in height; it has a straight erect trunk, and a round or oval head. The leaves are ovate cut and serrated, white and downy beneath; the flowers in large terminal corymbs; the fruit scarlet, and the size of a small pea; is acid and astringent, but becomes agreeable by incipient decay. It is sometimes called service-berry, and resembles it in quality, although much smaller. Bear is made of it by fermentation. The wood, very hard and fine-grained, is used for cog-wheels. The whiteness of the foliage makes the tree ornamental in plantations. It is a native of Europe and Asia.

**BEAN-CAPER** (*Zygophyllum fabago*), a small tree found in the Levant, where its flower-buds are used as a substitute for capers.

**BEAN-FEAST**, the name of an annual dinner given by employers to their employés; probably so called because of the prominence of beans or of a bean-geese at the repast. The name bean-feast was often given also to the bean-king's festival.

**BEAN KING'S FESTIVAL**, a social rite principally observed in France, from which country it seems to have been transplanted to Germany. On the evening of the Twelfth Day, or, as the Germans call it (in allusion to the legend that the wise men of the East who came to worship Christ were three kings), Three Kings' Day (Dreikönistag), companies assemble to spend a few hours in mirthful relaxation. A large cake is baked with a bean hidden somewhere in it. The cake is then divided, each person present receiving a piece, and whoever obtains the one with the bean is king for the year. In this capacity he holds a mock-court, and receives the homage of the company, who also amuse themselves with other diversions. The bean king, however, is compelled to pay for his dignity; for he has to give an entertainment on the next Twelfth Night, that an opportunity may be afforded to choose another king.

**BEAR-BAITING**, a barbarous sport existing formerly in several countries, in which bears were baited by dogs. It was one of the established English amusements among the lower classes and the aristocracy alike; Queen Elizabeth, according to narration, herself witnessed these rude exhibitions. *Bear-garden* was the term applied to any place where bears were kept and publicly baited. Until lately, a certain spot situated near Westminster was known by this name.

**BEARBERRY**, a name somewhat loosely applied to several shrubs. The red bearberry (*Arctostaphylos uva-ursi*), also called bear's grape, bear's bilberry, and foxberry, is the "kinnikinnic" of the American Indian, and is much used in medicine as an astringent tonic, under the name of *uva-ursi*. The black bearberry (*Arctostaphylos alpina*) is a dwarf arctic-alpine trailing shrub, with black berries which are sometimes eaten. A species of *Rhamnus* known as bearberry, bearwood, and by the specific designation *purshianus*, from the fondness of bears for its berries, yields the *Sascara sagrada* bark, used as a tonic aperient.

**BEARD**, **GEORGE MILLER**, a physician, born at Montville, Conn., May 8, 1839, died in New York, Jan. 23, 1883. He studied at Phillips' Andover Academy and Yale College. In 1865, after over a year of experience as assistant surgeon on the gunboat *New London*, he settled in New York and devoted his attention to nervous diseases. Among his works are: *General Electrization, Stimulants and Narcotics, Eating and Drinking, Clinical Researches in Electro-Surgery, Legal Responsibility in Old Age, Hay Fever, Physiology of Mind Reading, Problems of Insanity, and Inebriety and Allied Nervous Diseases of America*.

**BEARD**, **WILLIAM HOLBROOK**, an artist, born at Painesville, Ohio, April 13, 1825. He devoted himself at first to portrait painting. He visited Europe, where he pursued his art studies for one summer. Returning, he settled in New York city and painted pictures of animals which he depicts in allegorical style. Some of his paintings are *Kittens and Guinea Pig, Bears on a Bender, Raining Cats and Dogs, Voices of the Night*, and *Who's Afraid?* A collection of his sketches entitled, *Humor in Animals*, was published in 1885. He had four sons, all of whom are clever artists. The best known is Frank, the third son, who was in the employ of Harper & Brothers during the war. He lectures, and at the same time illustrates his subject with free-hand sketches. He has published a book entitled, *The Blackboard and the Sunday School*.

**BEARDSTOWN**, one of the oldest towns of Illinois, situated on the Illinois River, about fifty miles west of Springfield. It has manufactories of machinery, iron, flour, woolens, and lumber, and the springs which yield the noted "Lithia Water."

**BEARER COMPANY**, an organization for the removal of wounded soldiers from a battle-field. The service, which was first introduced into the army of Great Britain in 1873, is well equipped, and forms a most efficient link between the battalion stretcher bearers and the field hospitals.

**BEAR-LEADER**. In former times bears were led about the streets muzzled and made to dance or stand on their hind legs for popular entertainment, small dancing dogs being usually added for the sake of attractiveness. Hence the phrase came to be used of a discreet person who took charge of a young man of wealth on his travels.

**BEAR-PIT**, a pit prepared for keeping bears, usually seen in zoological gardens. It is circular, measuring about 25 feet in diameter, and 20 feet deep. The sides, generally built with brick, the bottom level and paved with stone, and around are vaults for the residence of the bears; from the center of the pit rises a stout, tall pole, on which are cross-bars at proper distances, to enable the bears to climb to the top. The poles are sufficiently distant from the sides to prevent the bears from leaping out. The vaulted receptacles require to be cool and dry.

**BEAR RIVER**, a river of the United States, which rises in the Rocky Mountains and empties into Great Salt Lake. Its total length is about 400 miles.

**BEAR RIVER**, a port of entry in Digby county and township, Nova Scotia, at the head of navigation; it carries on shipping and a considerable manufacture in lumber and leather.

**BEARS AND BULLS**. See *Britannica*, **BULLS** AND **BEARS**.

**BEAR'S GREASE**. Under this name there were sold preparations for the toilet, represented to be of great efficiency in nourishing and promoting the growth of hair; these so-called preparations of bear's grease being for the most part composed of purified beef-marrow, hog's lard, or fat of veal and

spermaceti, along with almond oil, and some scented ingredients.

**BEARING** of a ship at sea is the direction in which she sails, in reference to the points of the compass. On shipboard, seamen often conveniently refer to the bearing of another ship, or of an object on shore, not to the points of the compass, but relatively to the line followed at the moment by the ship's keel. Thus the bearing of a distant object may be *ahead*, *astern*, on the *starboard bow*, on the *larboard quarter*, etc., the bow being between the head and the midship, and the quarter between the midship and the stern.

**BEARING THE BELL**, a phrase which signifies to take the lead or first place in anything, or to carry away the prize. This old colloquial phrase is said to have originated in a practice, at the early part of the seventeenth century, of giving a small golden or silver bell as a prize to the winner at horse-races.

**BEAS**, a river of India, one of the "Five Rivers" of the Punjab, rises in the Snowy Mountains, 13,320 feet above sea-level, and flows through the Kangra Valley to the plains of the Punjab, where it empties into the Sutlej. Its length is nearly 300 miles.

**BEAT**, in music, a signal given by the hand to insure simultaneous performances, the hand being raised on the unaccented, and lowered on the accented, part of the bar.

**BEAT OF DRUM** in military matters, is a signal or instruction conveyed by a particular mode of drum-beating. It is an audible semaphore, a telegraph which speaks to the ear instead of the eye. There are many varieties, known by the names of the general, the assembly, the foot march, the call to arms, the drummer's call, the sergeant's call, etc. Some of the same instructions or commands are also given by the bugle, and some by the trumpet.

**BEATIFICATION** is a solemn act in the Roman Catholic Church, by which the Pope, after scrutinizing the life and services of a deceased person, pronounces him blessed; after this he may be worshipped in a specified portion of the church, and the act holds out the prospect of future canonization, which entitles him to general worship in the church universal. It was introduced in the 12th century, and may be regarded as an inferior degree of canonization. See *Britannica*, Vol. V, p. 23.

**BEATIFIC VISION**, the direct vision of God, constituting the essential bliss of angels and of glorified saints, is, in respect of the latter, put by the Greek Church, and by most Protestants, after the day of judgment. The Council of Florence and the Council of Trent, however, declared that "the souls of those who have remained pure and spotless after baptism, and of those whose sins after baptism have been pardoned, either in this life or in the next, are immediately received into heaven."

**BEATING AND WOUNDING**, or simply wounding, is the name sometimes occurring in law books for the offense of seriously wounding or hurting another; it has also been described as an aggravated species of battery.

**BEATING THE BOUNDS**, the popular English expression for those periodical surveys or perambulations by which are preserved the early parish boundaries, the procedure, according to the general custom, being as follows: On Holy Thursday or Ascension Day the clergyman of the parish, in company with the parochial officers and other parishoners, followed by the master of the parish school together with the boys, visits the different parish boundaries, the boys striking each of these with peeled willow wands, from which action has come the expression beating the bounds. Sometimes the boys

themselves were beaten, to make the locality memorable. See *Britannica*, Vol. XVIII, p. 295.

**BEATON**, JAMES, uncle of Cardinal Beaton, was Archbishop of Glasgow, and afterwards of St. Andrews. He was a zealous opponent of the Reformation. He died at St. Andrews in 1539. See *Britannica*, Vol. III, pp. 465-66.

**BEATON**, JAMES, nephew of Cardinal Beaton, born in 1517, died in 1603. In 1552 he became Archbishop of Glasgow. On the death of Mary of Lorraine he withdrew to Paris. See *Britannica*, Vol. III, pp. 465-66.

**BEATRICE**, a city of Nebraska, and capital of Gage county, on the banks of the Blue River. It is nearly in the center of the county, which is very fertile, producing almost all kinds of grain and grapes grown in this country. It was settled in 1857, and incorporated as a city in 1883. During the last decade it has made rapid strides in population and business. Four great railroads center here: viz, Burlington & Missouri, Union Pacific, Rock Island, and Kansas City & Beatrice. It is the second city in the State in its railroad accommodations, Omaha, one hundred miles distant, standing first. The city is regularly laid out; streets are broad, crossing at right angles and well lighted with gas and electricity. There are six miles of paved streets, six miles of street car tracks, and abundance of good water from artesian wells. The Holly system of water works is employed, using twelve miles of mains. Telegraph and telephones afford all needed means of communication.

The public buildings are substantial, and built with much architectural taste. The new court-house is a fine stone structure of four stories, with a tower 120 feet high. The main front is 140 feet, and the east and west fronts each 82 feet. The style is Romanesque. The city-hall is a solid and commodious two story building. Other fine buildings are the Nebraska National Bank, Beatrice National Bank, Masonic Temple, Nebraska Institution for Feeble-minded Youth, and High School. There are six banks, including two national banks, and five public schools. The High School prepares pupils for admission to the State University. There is also an excellent Business College and a large free circulating library. The postoffice is self-supporting, and in addition pays \$7,000 annually to the government. The fire department is ample and efficient. Beatrice is noted for quarries of magnesian limestone, used as a building material. The river furnishes a fine water-power. The principal manufactures are cement, flour and lumber. Beatrice is the headquarters for the work of the United States land-office for the Nemaha district. Population in 1880, 2,447; in 1890, 13,921.

**BEAUCE**, a district of France, celebrated for the beauty and fertility of its grain-fields. The capital is Chartres.

**BEAUCLERC**, TOPHAM, an intimate friend of Samuel Johnson, and grandson of the first Duke of St. Albans, born in 1739, died in 1780. In 1768 he married Diana, daughter of the Duke of Marlborough, and divorced wife of Lord Bolingbroke.

**BEAUFORT**, HENRY, CARDINAL, natural son of John of Gaunt, and half-brother of Henry IV, born in 1377, died in 1447. He was made a cardinal in 1426. He was known as the wealthiest man in England. He was devotedly attached to King Henry V, to whom he lent sums of money almost fabulous for those days.

**BEAUFORT**, a town of North Carolina, capital of Carteret county, and a port of entry, is situated at the mouth of Newport River. Its harbor, defended by Fort Macon, is the best in the State. The



Cape Lookout Light-house, 156 feet high, is eleven miles southeast.

BEAUFORT, a town of South Carolina, capital of Beaufort county, and a port of entry, is situated on Port Royal or Beaufort Island, and on an arm of the sea called Port Royal River. There is an excellent harbor for vessels drawing 15 to 16 feet of water. The chief exports are lumber, rice, cotton, and phosphate of lime.

BEAUFORT, an inland district of the west division of Cape Colony, South Africa, chiefly used for pasturage; its oxen being, in seasons of abundant rain, decidedly the fattest in the colony. Its area is about 13,050 square miles. West Beaufort, its capital, is on the Gamka, 368 miles east of Cape Town.

BEAUGENCY, an ancient town of France, in the department of Loiret, situated on the right bank of the Loire, 15 miles southwest of Orleans. It was at one time surrounded by walls, flanked with towers and bastions, and defended by a strong castle, now ruined. In the histories of the wars of France it occupies a conspicuous place. It was successively in the hands of the Huns, Saxons, Normans and English, but it sustained most damage during the religious wars of the 16th century. It has manufacturing of woollens, leather, etc., and has a trade in wine, wool, and corn. Population, 3,882.

BEAUHARNAIS, ALEXANDRE, VICOMTE DE, grandfather of Napoleon III, was born at Martinique in 1760. He served under Rochambeau in the American Revolution, and in 1789 he participated in the French Revolution. He was secretary of the National Assembly, and a member of the military committee. He declined the office of minister of war in 1793, and resigned the command of the Army of the Rhine. In 1794 the revolutionary tribunal sentenced him to death upon a charge of having acceded to the surrender of Mainz, and he died on the scaffold, July 23 of that year.

BEAUJOLAIS, a district of France, a subdivision of the old province of Lyonnaise, is noted for its fine vineyards, which yield the excellent Beaujolais wine.

BEAULIEU, a village of Hampshire, England, the site of an ancient Cistercian abbey founded by King John; the village is situated on the verge of the New Forest, near Lymington.

BEAUMONT, a town of Texas, county-seat of Jefferson county, situated on the Neches River, at the head of tide-water navigation, about 80 miles east of Houston. It is in the heart of the lumber belt of eastern Texas, and has a large trade in yellow pine and cypress lumber and shingles, which are here manufactured and shipped by water via Sabine Pass.

BEAUMONT, JEAN BAPTISTE ELIE DE, chief engineer and professor of geology in the School of Mines at Paris and in the *Collège de France*, born at Canon in 1798, died in 1874. He was a practical geological investigator, as well as a clear and acute speculator.

BEAUMONT DE LA BONNIÈRE, GUSTAVE DE, a French advocate and publicist, grandson of La Fayette, born in Sarthe in 1802, died in 1866. He became a member of the Chamber of Deputies in 1840, and of the National Assembly in 1848. In 1851 he was imprisoned for his opposition to the *coup d'état* of December. The works by which he is best known in America are *Slavery in the United States* and *The Penitentiary System of the United States*, founded upon personal observation during a visit to this country.

BEAUMONT, JOHN C., a rear-admiral of the United States navy, born in Pennsylvania in 1821, died in 1882. He was distinguished for his efficient

service during the shelling of Drury's Bluff and in the two attacks on Fort Fisher. He became a captain in 1872 and rear-admiral in 1881.

BEAUMONT, WILLIAM, born at Lebanon, Conn., 1796, died at St. Louis, Missouri, April 25, 1853. While United States surgeon at Mackinac in Michigan, he was called to attend Alexis St. Martin, who had been shot in the side. The wound healed, but an opening in the stomach remained, through which Dr. Beaumont was able to watch the process of digestion. The results of his investigations were published, and proved a valuable addition to physiological knowledge.

BEAUNE, FLORIMOND, an eminent French mathematician, born at Blois in 1601, died in his native town in 1652. He was a friend of Descartes, whose work he much improved. He is regarded by many as the proper founder of the integral calculus.

BEAUPORT, a manufacturing town of Canada, about four miles northeast of Quebec. It contains the famous Beaufort Lunatic Asylum and important manufactories of lumber, nails and flour.

BEAUREGARD, PIERRE GUSTAVE TOUTANT, born near New Orleans, La., May 28, 1818. He graduated at West Point in 1838, standing second in a class in which were men who afterwards became famous generals. In 1847 he was made captain of engineers, having served at various stations, and during the war with Mexico in engineering work. When the Southern States seceded he offered his services, and those were his troops which opened fire on Fort Sumter. From this time onward he was virtually the commander of the Confederate troops. He was in command at Charleston for a year and a half; he reinforced Lee in 1864; defeated Butler, and held Petersburg. He attempted to check Sherman's march to the sea but was unsuccessful, and with General J. E. Johnston surrendered to Sherman in April, 1865. Since the war General Beauregard has been president of a railroad, adjutant-general of the State and manager of the Louisiana State lottery.

BEAVER, a remarkable rodent (*Castor fiber*), once common to all northern regions, but now confined chiefly to North America. It is characterized by a blunt nose, very short ears, webbed hind feet, and a tail flat, ovate, and covered on its upper surface with scales. The beaver is an object of much interest on account of the ingenious houses, with subaqueous entrances, which it builds on the banks of rivers and lakes, and for its remarkable skill in the construction of dams across streams. It is prized for its fur, and for a secretion called castor, or castoreum, much used in perfumery and formerly in medicine. See *Britannica*, Vol. III, pp. 475-6; Vol. XV, p. 418, and Vol. IX, p. 838.

BEAVER, JAMES ADDAMS, a descendant of a famous Huguenot family, born at Millertown, Perry county, Pa., Oct. 21, 1837. He graduated at Jefferson College, and afterwards practiced law at Bellefonte. In 1861 he responded to the call of President Lincoln for volunteers, and was soon made lieutenant-colonel of a regiment. He was wounded at Chancellorsville, was present at Gettysburg, but not allowed to take command on account of physical weakness. He was in the Wilderness campaign, and was again wounded at Cold Harbor. At Petersburg he was injured, but returned to the battle-field of Ream's Station in an ambulance, and just as he had resumed command his right leg was shattered by a rifle-ball. It was amputated, and he was incapacitated for further military service. He was elected a trustee of the Pennsylvania State College; has been a popular campaign speaker, and was Republican governor of Pennsylvania from 1887 to 1891.

**BEAVER**, a town of Pennsylvania, county-seat of Beaver county, situated on the Ohio River, about twenty-five miles from Pittsburgh. It is the seat of Beaver Collegiate and Musical Institute, an academy, a seminary, and other excellent schools.

**BEAVER**, a city of Utah, county seat of Beaver county, situated on Beaver River, about 200 miles south of Salt Lake City. Lead and copper are found in the neighborhood, and there are manufactories of leather and woollens. Beaver is the seat of a fine academy.

**BEAVER DAM**, a city of Wisconsin, situated on Beaver Dam Creek, about 60 miles northwest of Milwaukee. It has an excellent water-power, and manufactories of woollens, flour, carriages and agricultural implements. It is the seat of Wayland University.

**BEAVER FALLS**, a manufacturing town of Pennsylvania, located on Beaver River, about 30 miles northwest of Pittsburgh. An excellent water-power and an abundant supply of natural gas are utilized in the manufactories of the town, which include those of iron, machinery, flour, cars, cutlery, wire fence, stoves and farming utensils. Beaver Falls is the seat of Geneva College.

**BEBEERINE**, an alkaloid obtained from the Greenheart bark, or *Bebeeru* of Demerara, and used in medicine in place of quinine, which it resembles in properties, though it is not so powerful in its action as a tonic and febrifuge. The condition in which it is generally sent into market is as the sulphate of bebeerine, occurring in shining scales of a pretty brown color, and soluble in water.

**BEBEERU**, or **BIBIRU**, the native name of the Greenheart of commerce, a tree of British Guiana, of the natural order *Lauraceæ*. The wood is very hard and durable, and is largely used in ship-building and for submarine structures, being remarkably free from the ravages of the ship-worm. The active principle of the bark is the bebeerine or bibirine of medicine, used in the form of a crude sulphate as a bitter tonic and febrifuge. See *Britannica*, Vol. III, p. 633.

**BECANCOUR**, a town of Canada, about 90 miles southwest of Quebec. It is the headquarters of an extensive trade in lumber and flour.

**BECCAFICO**, a little bird of the family *Sylviadæ*, or Warblers, a native of the southern parts of Europe, and in great demand for the table in Italy, its flesh being regarded as of peculiar delicacy. It is a mere summer bird of passage, and has a very pleasant song. Beccafico is an Italian name, and is sometimes extended to other birds of the same family used for the table.

**BECCAMOSCHINO**, a little bird of the family of Warblers, found in Italy, and remarkable for its nest, which resembles that of the tailor birds, usually placed in a bush of lengthened herbage, the leaves and stalks drawn over it, and a flooring formed for it by leaves curved across below, and sewed together generally with some kind of vegetable fibers.

**BECHUANALAND**, a British-African crown colony adjacent to the South African Republic on the east. Total area, 162,000 square miles, of which 45,000 form the crown colony proper. Population (of British colony in 1885), 44,135. The colony was "annexed" in 1884 to Cape Colony, and is under the general control of the British Governor of that Colony. The revenue in 1889, including military grant, was \$445,085, and the expenditure \$308,315.

A tax of 10s. per annum is levied on every native hut, and 10s. on each wife of a native. The seat of administration is at Vryburg in Stellaland, a settlement originally formed by the Boers on the border of the Transvaal. There are good roads.

There is a weekly post to Cape Colony and Matabeleland. The chief of the protectorate is Khama, with whom is an assistant commissioner.

**BECK**, CHARLES, PH. D., LL. D., born in Germany in 1798, died in 1866, was a philologist, professor of Latin and Literature, 1882, at Cambridge, Mass. He published several works, among which was *The Manuscripts of the Satyricon of Petronius Arbiter Described and Collated*.

**BECK**, DAVID, born 1621, died 1656, was a Dutch portrait painter, who studied under Vandyke. He worked with great speed and was remarkably successful. He was employed by Charles I of England, and by Queen Christina of Sweden.

**BECK**, JOHANN TOBIAS, a distinguished German theologian, born at Balingen in 1804, died in 1878. The scene of his labors was Tübingen, where he studied theology, and where, as professor of theology for many years, he combated the negative criticism of the "Tübingen school" of Bauer; not so much, however, by direct controversy as by the development of a system of biblical divinity founded upon faith in the text.

**BECKER**, GOTTFRIED WILHELM, a German author born at Leipsic in 1778, died there in 1854. He studied medicine, and in 1801 settled in Leipsic as a practicing physician and a writer of medical works, several of which reached many editions. In 1833 he entirely relinquished the practice of medicine, and devoting himself to literature became a fertile and admired contributor to many of its more popular branches.

**BECKER**, KARL, a German artist, born at Berlin in 1820. His subjects are mostly historical, but are chosen with a view to the display of gaudy coloring or intricate architectural combinations.

**BECKER**, KARL FERDINAND, born at Leipsic in 1804, may be named with Kieseewetter and Winterfeld as one of the best German writers on the history of music, and also as an excellent composer for the organ, as is proved by his trios and other compositions well adapted to the genius of the instrument. Among his works may be mentioned a *Choral Book*, or collection of psalm and hymn tunes; a catalogue of his musical library one of the most extensive in Germany; *The Composers of the 19th Century*, etc.

**BECKERATH**, HERMANN VON, born in Krefeld, Prussia, in 1801, died there in 1870. He took a prominent part in the political affairs of Germany. When Frederick William IV ascended the throne, Beckerath, aroused to a sense of the political state of the country, devoted himself to effecting its constitutional freedom. In 1843 he was elected representative of his native town in the provincial diet, and until 1852 was an active participant in the politics of Prussia.

**BECKETS**, on shipboard, a general name for any large hooks, short pieces of rope, or wooden brackets, used for confining ropes, tackles, oars or spars in a convenient place.

**BECQUEREL**, ANTOINE CESAR, a well-known physicist, born in France in 1788, died in 1878. Through certain experiments made by him on the liberation of electricity by pressure, in a course of study concerning the properties of yellow amber, Becquerel made discoveries which overthrew Volta's theory of contact, and he himself constructed the first constant pile. He afterward discovered a method of ascertaining the internal temperature of the animal body, and by physical applications demonstrated that upon the contraction of a muscle there is a development of heat. He is one of the inventors of electro-chemistry, and originated a method of electrotyping. In connection with his son (Alexander Edmond, born at



Paris in 1820) he made interesting researches concerning the solar spectrum and electric light.

BECSE, the name of two towns of Hungary, known as Old Becse and New Becse. They are situated about eight miles apart, on the Theiss River, 50 miles south of Szegedin.

BECSKEREK NAGY, or GREAT BECSKEREK, a town of Hungary in the county of Torontal, situated on the left bank of Bega, about 45 miles southwest of Temesvar, with which place it is connected by a canal. It is an important market town. Population, 19,700.

BED, an article of household furniture on which to sleep. Beds are and have always been of various styles, nearly all countries having their own peculiar form. As far as has been ascertained, the people of ancient Palestine had a simple sort of couch suitable for resting on during the day, or sleeping on at night, being easily moved. In the European countries the bed is of an open couch form, affording accommodation for but one person. It is composed of a frame or bedstead (See Britannica, Vol. IX, p. 849), upon which are placed one or two mattresses of hair or wool, and curtains, which hang from the ceiling, often accompany it. The Germans frequently lay a large flat bag of down above the other covering for the sake of warmth. The American style is generally that of the French, the open couch form. The folding tressel-bed, frequently seen in America, is, next to the oriental rug spread out on the floor, the simplest bed yet invented. It is constructed on the plan of a campstool, with a movable head-board to retain the pillow.

BED, or STRATUM, is a layer of sedimentary rock of similar composition, and of some thickness, cohering so that it may be quarried and lifted in single blocks. Beds frequently consist of many fine laminae or plates. The laminae are the results of intermissions in the supply of materials produced by river-floods, the ebb and flow of the tide, and similar causes, or by the more or less turbid condition of the water under which they were deposited.

BEDCHAMBER, LORDS OF THE, are twelve officers in the royal household of Great Britain, who wait in turn upon the king's person. They are under the Groom of the Stole, who accompanies the sovereign only on state occasions. There are also thirteen grooms of the bedchamber, who attend in turn. In the reign of a queen, ladies fill these offices, which are objects of high ambition. See Britannica, Vol. XXI, p. 37.

BEDEAU, MARIE ALPHONSO, a French general, born at Verton, 1804, died in 1863. In 1817 he entered the military school, and in 1825 received a commission in the army. He was aid-de-camp to General Gérard in the Belgian campaign of 1831-1832. He was sent to Algeria in command of a battalion in 1836, and was for a time governor of Algeria in 1847. He was appointed minister of war by the provisional government in 1848, an office which he changed for the command of the city of Paris, and as a republican member of the national assembly he opposed Louis Napoleon. Bedeau was arrested, with Cavaignac and others in 1851, and went into exile.

BEDEGUAR, or BEDEGAR, a remarkable gall, frequently occurring on the branches of several species of roses, mainly of the sweet-brier, on which account it is sometimes termed sweet-brier sponge. It is produced by different species of gall insect, sometimes by *Cynips rosea*. It is generally roundish in form, often having a diameter of an inch or more; it has a spongy and fibrous nucleus, containing numerous cells, in each of which is a small

larva; it has a shaggy exterior covered with moss-like, branching fibers, which change from a green to purple or red. It was at one time esteemed as a medicine. See Britannica, Vol. X, p. 44; Vol. XIII, p. 143.

BEDDELL, GREGORY THURSTON, born at Hudson, New York, Aug. 13, 1817. His father was a clergyman, and the son, after graduating from Bristol College, Pa., and the Virginia Theological Seminary, became rector of Trinity Church, West Chester, Pa. (1841), and then rector of the Church of the Ascension, New York city (1843). He has been assistant bishop of Ohio, and bishop of the diocese. Several of his addresses have been published.

BEDDELL, GREGORY TOWNSEND, born on Staten Island, N. Y., Oct. 28, 1793, died at Baltimore, Md., Aug. 30, 1834. He was educated at the Episcopal Academy in Cheshire, Conn., and at Columbia College. He became rector of the Episcopal Church at Hudson, and subsequently at Fayetteville, N. C., and at Philadelphia, Pa. At the latter place St. Andrew's Church was established through his labors. He was the author of religious works and musical compositions.

BEDFORD, a town of Indiana, county-seat of Lawrence county. The chief manufactures are of wool and lumber, and among the principal buildings are a fine court-house and town hall. Bedford is the seat of an academy, and of the Bedford Male and Female College.

BEDFORD, a prairie town of Iowa, county-seat of Taylor county, situated on the One-Hundred-and-Two River, about 100 miles southwest of Des Moines. It is the center of a fertile agricultural district.

BEDFORD, a town in Pennsylvania, located on a branch of the Juniata, about 100 miles west of Harrisburg. The manufactures are principally of iron, which is mined in the vicinity. About a mile distant is Bedford Springs, a fashionable summer resort.

BEDFORD SPRINGS, a summer resort in Pennsylvania, near the town of Bedford, noted for the valuable medicinal waters of its mineral springs, and for its cool summer climate and charming mountain scenery.

BEDLAM (corruption of Bethlehem), the name of a hospital for lunatics in London. It was originally founded by Simon Fitz-Mary, in 1246, "as a privy of canons for brethren and sisters." When the religious houses were suppressed by Henry VIII, it fell into the possession of the corporation of London in 1537, who converted it into an insane asylum. In 1675 the building was pulled down and a new one erected in Moorfields; the present one was built in 1814 in St. George's Fields. The building with its grounds covers an area of 14 acres, and is lacking in nothing likely to insure the comfort and promote the recovery of patients. In former times the management was deplorable. The patients were exhibited to the public like wild beasts in cages, at so much per head, and were made sport of by visitors. The funds not being sufficient to meet the expenditure, partially convalescent patients, with badges affixed to their arms, and known as "Bedlam Beggars," were turned out to wander and beg in the streets. This practice appears to have been stopped in 1675. Now the management of the patients is so excellent that annually many are returned as cured. See Britannica, Vol. XIII, p. 110.

BEDLINGTON TERRIER, a dog so named from a village and parish of Northumberland, one of the districts in which the race has been extensively bred. This dog is highly esteemed for its sagacity and speed, and for its wonderful courage. It is a good water dog, and has a marked dislike for all

kinds of vermin; it will unflinchingly attack even the fox, the otter or the badger.

BEDLOE'S ISLAND, the site of Bartholdi's statue of *Liberty Enlightening the World*, is situated in New York harbor, within the limits of the city of New York. It was named from a former owner. It became, in 1800, the property of the United States. In 1841 the government erected here a fort, known as Fort Wood, which mounted seventy-seven guns. The fort is now disused, and the statue occupies nearly the whole of its interior.

BEDMAR, DE, ALFONSO DE CUEVA, MARQUIS, born in 1572, died in 1655. He was appointed ambassador to Venice from the Spanish court in 1607, whereupon he entered into a bold and unscrupulous plot to destroy that city, through which act he has become lastingly notorious. (See *Britannica*, Vol. 24, p. 147.) Otway's popular and pathetic play, "Venice Preserved" is founded on this circumstance. Bedmar afterward became president of the council at Flanders, and in 1622 was created cardinal by the Pope. He subsequently went to Rome, after which he returned to Spain as Bishop of Oviedo.

BED OF JUSTICE, literally, the seat or throne occupied by the French monarch when he was present at the deliberations of parliament. Historically a bed of justice signified a solemn session in which the king was present to overrule the decisions of parliament, and to enforce the acceptance of edicts or ordinances which it had previously rejected. The last bed of justice was held by Louis XVI at Versailles in 1787.

BEDOS DE CELLOS, DON JEAN FRANÇOIS, a Benedictine monk, of the congregation of St. Maur, and the most learned and practiced master of the art of organ-building in the eighteenth century,

whose work on the art is of the greatest importance to the present day. He was born about 1714, at Chaux and died in 1797. He entered his order about 1726 at Toulouse, where he built several large and superior church-organs—was elected member of the Academy of Sciences in 1758, and completed for the Academy his great work, *L'Art du Facteur d'Orgues* in four volumes, large folio, with 137 copperplates, beautifully executed.

BED-SORES, a very troublesome complication of disease, to which, in many cases, a patient is liable through long confinement to bed, when unable or not allowed to change his position. When long confinement to bed is expected, attempts should be made to thicken the cuticle, and enable it to bear pressure better, by rubbing the skin with some stimulant, as spirits or *eau-de-cologne*.

BEDSTRAW, a genus of plants belonging to the natural order *Rubiaceæ*, and distinguished by a small wheel-shaped calyx and a dry two-lobed fruit, each lobe containing a single seed. The leaves as in the rest of the order, are whorled and the flowers minute, but in many of the species the panicles are large and many-flowered.

BEDWIN, GREAT, a town of Wiltshire on the Kennet and Avon canal, sixty-nine miles west-by-south of London. A fierce but indecisive battle occurred here in 674, between the kings of Mercia and Wessex. St. Mary's Church was built in the beginning of the fourteenth century and is constructed of flint, except the piers, arches, and dressings, which are of freestone. Jane Seymour, one of the queens of Henry VIII, was born here. In the end of the last century the remains of a Roman villa were discovered, included tesserae, bricks, a tessellated pavement, a huge leaden cistern, and the foundation of baths. Population, 2,068.

BEE ANATOMY AND BEE INDUSTRY. For the general subject of bees and bee culture in various countries, see *Britannica*, Vol. III, pp. 484-503. The illustrations herewith will properly supplement that portion of the article in Vol. III relating to the anatomy of bees. For convenience of reference, the illustrations are given in two plates. (See next page.)

BEE INDUSTRY IN THE UNITED STATES: The latest official government report (that of 1889), issued before these pages were sent to press, shows that among the minor branches of rural industry, bee-keeping is the most important. Every State and Territory reports bees and more or less honey, usually a hive or a few colonies for each farmer, rather than extensive apiaries and large production. In some localities, as in portions of New York, Ohio, Tennessee, Colorado, and California, where existing conditions are particularly favorable, apiculture is more prominent, dominating other industries in certain neighborhoods, though very rarely the leading branch over any considerable area. Honey and bees-wax are produced in every section of the country, and the aggregate value is very large, nearly equaling the value of the rice or the hop crop, and not much below that of buckwheat, and exceeding that of cane molasses, or of both maple syrup and sugar. It largely exceeds the aggregate value of all other vegetable fibers, excepting cotton.

The latest official record of production by States is the return of the national census for the year 1879. It made the honey production 25,743,208 pounds, and wax 1,105,689 pounds. After careful study of all available data of local values and mar-

ket prices, the average farm value of the honey was estimated at 22 cents per pound, and the wax at 33 cents, making the aggregate value of aparian products, at the place of production, \$6,028,383. The product of the principal States in that year was as follows:

| States.             | Honey.         | Wax.           |
|---------------------|----------------|----------------|
|                     | <i>Pounds.</i> | <i>Pounds.</i> |
| Tennessee.....      | 2,130,689      | 86,421         |
| New York.....       | 2,088,845      | 79,756         |
| Ohio.....           | 1,626,847      | 56,333         |
| North Carolina..... | 1,591,590      | 126,268        |
| Kentucky.....       | 1,500,565      | 46,912         |
| Pennsylvania.....   | 1,415,098      | 46,610         |
| Illinois.....       | 1,310,806      | 45,640         |
| Iowa.....           | 1,310,138      | 39,565         |
| Virginia.....       | 1,090,451      | 53,200         |
| All other.....      | 11,678,184     | 524,984        |
| Total.....          | 25,743,208     | 1,105,689      |

Under the head of "all other," in the above statement, there is grouped the production of 36 States and Territories, ranging from 1,056,034 pounds of honey in Georgia to 50 pounds in Idaho.

Our foreign trade in honey has never been large, and the balance has fluctuated. During five years past our average annual exportation has been valued at only \$82,489 and importation at \$52,891, making the value of the net exportation only \$29,598. This little exportation goes principally to the United Kingdom, France and Germany, while our



foreign purchases come mainly from the West Indies and Mexico. The balance of trade is too small to affect the supply, and our domestic consumption is satisfied with our home production.

PLATE I. Fig. 1, the Queen Bee; 2, the Working Bee; 3, the Drone; 1a, 2a, 3a, the antennae; 1c, 2c, and 3c, the heads of queen, working bee, and drone; the head of the working bee is much flattened, as shown at 2c\*. A, the margins of two wings; B, the 18 or 20 hooks placed on the anterior portion of the hinder wing, while the posterior margin of the fore-wing is beautifully folded over to receive them, so that when employed in fanning for ventilation the two wings on each side act as one, and present an unbroken surface to the air. The wings of workers are larger than those of the queen, but those of the drones are much larger still. Fig. 2b, shows the inner side of the hind-leg and pollen brush; 2b\* the outer side and pollen basket. On entering a flower a bee often covers itself with pollen, and hence the need of the brush apparatus to reach home. The pollen basket is peculiar to the worker; neither the queen nor drone has anything of the kind. 2c, back view of the head, showing the opening into the oesophagus.

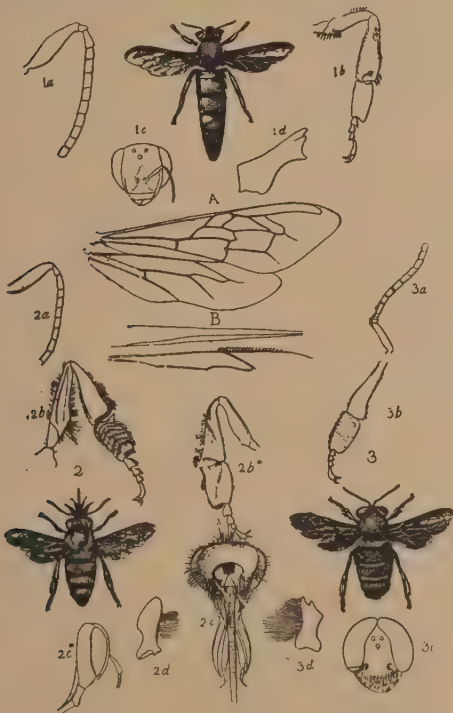


PLATE I.

PLATE II. b, b, b, the muscles that move the wings; e, e, e, the bases of the wings, the appendages consisting of two pairs arranged to hook together. Fig. 3a the lobal palpi; 3a the maxillae provided with hairs and with two feelers midway, known as maxillary palpi. 4. The sting of the working-bee, with its muscles and attachments; r, shows the muscles that move the sting, and q, the curved base of the outer sheath by which it is inclosed; the outer sheath consists of two fleshy claspers (q in the figure), inside of which is the linear sheath which forms an essential portion of the sting, and consists of two horny scales closely adhering to the darts; these last are composed of stiff filaments, barbed at the outer end with from five to ten teeth on one side, and they slide within the inner sheath and that within the outer sheath on the principle of the tubes of a telescope. The darts are first protruded in the act of stinging, and, by aid of the powerful muscles on each side at s, are buried in the flesh to the depth of one-twelfth of an inch; the inner sheath then follows, and, at the

same time, by a muscular contraction, the poison is forced along the groove in which the dart works, causing the well-known painful effects which arise from the sting of a bee. These darts are of slightly unequal lengths, so that the teeth on each side are not opposite to each other. From this arrangement it is easier for them to penetrate the flesh until the poison has been ejected. If the sufferer could only command himself so as to remain passive, the bee might be able to draw in those darts which protrude beyond the sheath and would then be able to withdraw the sting, and consequently inflict less pain, and also escape paying the penalty of her own life by leaving the whole stinging apparatus behind. The sting is about one-sixth of an inch long. The ducts which secrete the poison are at 4u, and the poison bag or reservoir at 4f. The drone and queen have no stings.\*

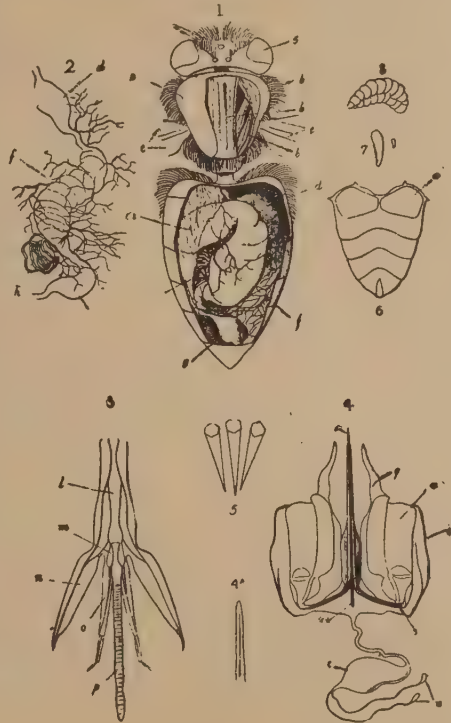


PLATE II.

6u, two wax pockets or receptacles for wax, which constitute the animal fat of the bee. The wax is not connected with the stomach, but exudes through the pores of the abdomen. The secreting vessels are probably contained in the membranes which line these pockets. 1 and 2a, biliary vessels which receive the chyle from the digested food in the bee's stomach.

Figs. 1 and 2d, the honey bag, an extension of the gullet or oesophagus, in which (though often called the 2d stomach) no digestion takes place; when full, it is about the size of a small pea. The bag is lined with muscles, by which the bee can discharge the honey into the store cells or send it forward into the oesophagus or true stomach for its own subsistence, (1 and 2f.). Fig. 7, a bee's egg; 8, a young bee in a chrysalis condition. Fig. 9, three of the 3,500 lenses in the eye of the bee, all of them converging toward a common center.

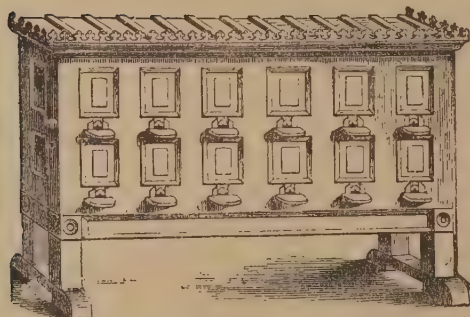
**BEE-HIVES AND BEE-HOUSES.** Numerous styles of these may be found in the various periodicals and hand-books devoted to the bee and honey industry of the country. Readers who propose to enter the business should furnish themselves with hand-

books, of which there are several of great practical value to the American public, and these hand-books should be supplemented by securing some live, current periodical which makes a specialty of the subject. The following cuts show a style much in use in countries of severe climates, especially in England and Scotland. They are covered with straw wrought in such manner as to combine beauty of finish with protection from cold.



BEE-HOUSE.

They can be made with or without supers, and so arranged as to be conveniently opened, carried or weighed. A sample of bee-house is also given, specially adapted to straw style of hive, but suggestive of other styles adapted to various kinds of hives. The front and rear views are both given by which their method and convenience in use will be readily indicated.



BEE-HOUSE FOR 12 HIVES—FRONT VIEW.



BEE-HOUSE FOR 12 HIVES—BACK VIEW.

The annexed illustration shows the ornamental zinc cover, and renders but little description necessary. Three clumps of wood must be driven into the ground, and the three iron rods supporting the covering made fast to them with screws; there are screw-holes in the feet of the iron rods for the purpose. When thus secured, but little fear need be entertained of its being blown over by high winds.

In the roof two pulleys are fixed, so that, by attaching a cord, the upper hive covering the bell-glass supers may be raised with facility for the purpose of observing the progress made by the bees.

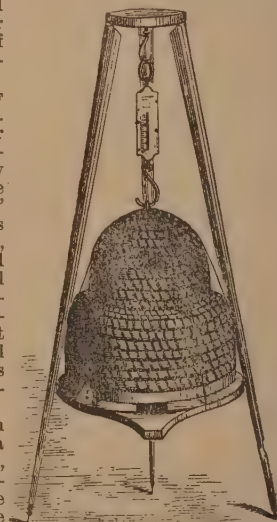
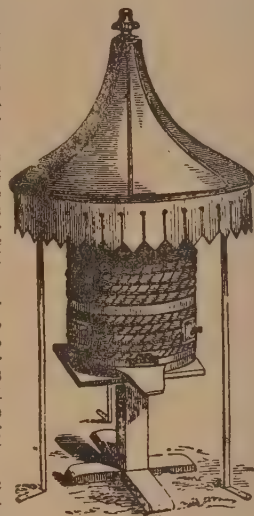
The ornamental zinc cover will form a pleasing object in the flower-garden when placed in a suitable position and neatly painted. Should the box style of hive be used, as is generally the case in most sections of the United States, a change in style of bee-house or cover will be at once suggested.

Next we insert an illustration suggestive of a convenient method of weighing hives, or sections of hives, of any form of construction.

**BEST METHOD OF MARKETING HONEY.** The following paper was read by Mr. Henry Segelken, of New York city, before the State Bee-Keepers' Association, at its meeting in Albany, Jan. 22-24, 1891, and is inserted by special permission. It supplies important information of great practical value to all interested in this rapidly growing industry:

For a 1-lb. section we recommend a single-tier crate, holding 24 or 25 sections. While we are not opposed to the double-tier crate, we believe the former is most desirable—at any rate for unglassed honey. If some of the combs in the upper tier start to leak, they will drop over the combs in the bottom rows and soil the whole crate.

Very often the shipper will figure the weight down to ounces, and mark the crate; for instance, gross, 28 lbs. 6 oz.; tare, 4 lbs. 4 oz.; net, 24 lbs., 2 oz. The 2 oz. we have to throw off every time—in fact, in some cases we are compelled to throw off quarters in order to effect a sale. All this can be, and should be, avoided by simply changing some of the combs

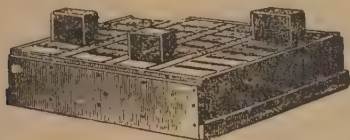




until the crate will weigh an even pound, or half pound, and by so doing he will receive pay for every ounce of honey. We would recommend to put only the *net* weights in plain figures on the end of the crates.

For glassed or unglassed honey we advise the use of heavy paper in the bottom of the crate, turned up about half an inch on the sides. If none of the combs should be broken down, this will prevent the honey from leaking through the crates. In addition, it is advisable to lay strips of wood of about  $\frac{1}{4}$  inch in thickness upon the paper, from side to side, for the combs to rest on. This will prevent the honey dripping from the broken combs from soiling the good combs. Of course, it is not necessary to go to this trouble when the honey is shipped in paper boxes.

For a paper box, we recommend those now used by nearly all the largest producers who use a paper box. It is made of heavy paste-board, and is strong enough to prevent breakage unless the honey is handled unusually rough. Where honey is put up in paper boxes, we would advise the use of a crate holding 25 sections, or by 5 (single-tier crate). The middle section on each side of the crate should be glassed, to show the quality of the honey. Honey put up in this style—clean, white crates, and boxes neatly labeled—will always sell at highest prices.



SINGLE-TIER CRATE.

"What part of the honey should be sent to market in paper boxes, glassed or unglassed?" Up to last year we have said, about one-third of each kind, as the demand was about equally divided. We now use 50 per cent. glassed, 30 per cent. paper boxes, and 20 per cent. unglassed, as near as we are able to estimate. During the season of 1889 we had more demand for glassed honey than for unglassed or paper boxes. We thought, perhaps, that year was an exception, but we have had more call for glassed honey this last season than the year before, and the demand for same is fast increasing. We could not nearly fill our orders for glassed honey this year, and could have sold thousands of crates more. We tried to substitute paper boxes and unglassed honey, but the trade would not have it in place of the glassed honey. We are of the opinion that this demand for glassed honey will be permanent, and we would therefore advise producers to glass more of their honey. It is certainly more profitable to glass the honey than to ship it in unglassed or in paper boxes. The producer receives the price of honey for every ounce of glass; besides, glassed honey will bring better prices than unglassed, and as good a price as paper boxes. The reasons why glassed honey has the preference seem to be these: The retailer can take every comb from the crate and make a handsome display of it (this, of course, can be done with the paper boxes, but the glass will show the quality of every comb); the dust cannot settle on the honey, and the glass will prevent inquisitive and curious customers from sticking their fingers in the comb.

Next comes the kind of section. For unglassed or paper boxes it does not matter which one is used—nailed, dovetailed or the one-piece section. For glassed honey we should say the nailed or dovetailed section is the most desirable, as the one-piece section does not seem to be strong enough to be glassed. Some producers will fasten the glass to the comb with small tin tags, others with small wire nails, and again others will glue them. Either method will answer the purpose if properly done. If glassed, a glue should be used which will stick and hold the glass to the section. We sometimes receive shipments of glassed honey glued, and as soon as touched the glass will fall from the sections and very often hurt the sale of the honey.

Another item of great importance is to have the sections weigh not over one pound each, and less if possible. Our market demands light weights at all times, be the honey glassed, unglassed, or in paper boxes. The latter two will generally weigh a little less than a pound, while glassed sections will in many cases weigh over one pound, especially if the standard section is used— $4\frac{1}{2}$  by  $4\frac{1}{2}$  by  $1\frac{1}{2}$ . We would advise producers to cut the section down in width and adopt a smaller one, say one  $4\frac{1}{2}$  by  $4\frac{1}{2}$  by  $1\frac{1}{2}$  or even  $1\frac{1}{4}$ , so that when glassed the section will not weigh over 14 to 16 ounces. Heavy sections are generally rejected, and we find it slow work in moving them off.

For extracted honey—basewood, white clover or buckwheat—we prefer a keg of about 150 lbs., half barrel of about 800 lbs., or even barrels of 500 lbs., whichever can be obtained cheapest. We would not advise the use of 60-lb. square tins, as used exclusively in California. Our trade is accustomed to the wooden packages for all kinds of northern, eastern, southern and western honey, and we see no necessity for a change. The cans are more expensive than kegs or half barrels; the honey in cans will not sell for any higher price, consequently nothing can be gained.

The shipping of comb-honey should be by freight altogether. We would advise shippers to load the honey in the cars themselves, properly protected. If this is done they may feel sure that the honey will arrive at its destination in good order under ordinary circumstances. Another point is that honey should be shipped only in original crates.

We would call your special attention to the *grading* of the honey, which is as important a question as any of the former, and in which too much care cannot be taken. Very often we receive honey which is not properly graded, and where off-grades are mixed in with the first-grade and marked No. 1 white honey. The outside combs will appear all right, but inside of the crate will be the poorer grade. We cannot take the trouble to open and examine every crate and comb, but have to rely on the shipper and go by the mark and the appearance of the crate. We sell and ship the honey, and the first thing we know, the party who bought it will complain about the quality and hold the honey subject to our order, and we must either have the honey shipped back to us or make an allowance satisfactory to the buyer. The shipper is also dissatisfied, as generally he expects highest market prices, and often will not admit that the honey was not properly graded, while no one but himself is to blame. All this can be avoided if the honey is properly graded.

Two grades of white honey are sufficient for our markets. For "fancy white," select only what is fancy white. For a second grade or "fair white" take combs that are stained or a trifle off in color, and combs scantily filled around the edges. Any combs mixed with dark or buckwheat honey should not be put in with the second grade. Such honey cannot be sold for white honey, and will not sell for more than buckwheat. In fact, a straight buckwheat finds better sale than mixed honey. This should be crated by itself and marked "mixed" or "dark" honey.

Our market demands a limited quantity of 2-lb. sections. About 10 per cent. of the honey we receive is in 2-lb. sections, which is sufficient to supply the demand. They should be glassed altogether and put in crates holding 12 or 15 sections.

Last, but not least, "What is the right time to ship comb-honey to market?" We have always advised early shipping, say during September and first part of October. Our experience teaches us that the early shippers obtain best prices and get quickest returns, be the crop large or short. In all our experience we have never known the market to advance during November and December, but it usually declines as the season passes along.

**BEEES AND BEE-KEEPING.** For an elaborate, practical, highly interesting article on this subject, see *Britannica*, Vol. III, pp. 484-503. It is estimated that there are in the United States over 70,000 beekeepers. The latest statistics giving a comparison of production for different countries are those of 1886, furnishing the following summaries:

| Countries.          | No. of hives. | Weight of honey in lbs. |
|---------------------|---------------|-------------------------|
| France .....        | 950,000       | 23,000,000              |
| Germany .....       | 1,454,000     | 40,000,000              |
| Russia .....        | 110,000       | 2,000,000               |
| Austria .....       | 1,550,000     | 40,000,000              |
| Belgium .....       | 200,000       | 5,000,000               |
| Holland .....       | 240,000       | 6,000,000               |
| Denmark .....       | 90,000        | 2,000,000               |
| Greece .....        | 30,000        | 3,000,000               |
| United States ..... | 2,800,000     | 62,000,000              |
| Total .....         | 7,424,000     | 183,000,000             |

Mr. Harbison, of California, was then reported as being the largest bee-owner in the world, having 6,000 hives, producing 200,000 pounds of honey yearly, valued at about \$40,000.

**BEECHER, CATHARINE ESTHER**, eldest child of Lyman, born at East Hampton, Long Island, Sept. 6, 1800, died at Elmira, N. Y., May 12, 1878. She was educated at Litchfield Seminary. Her betrothed lover, Prof. Fisher of Yale, was drowned while on a voyage to Europe, and her sorrow was so great that, according to her brother, Henry Ward, her religious faith was almost shipwrecked, and she only found relief by plunging into a life of great activity. The cause of female education was very dear to her heart, and in 1822 she started a school at Hartford, Conn., for young ladies. For ten years the school was carried on, and Harriet Beecher assisted in the teaching. The institution

prospered, and 160 pupils were in attendance. She was the author of some school-books, several works on the woman question, and a number of books on religion. She believed and taught that physical and moral training should receive the same attention as intellectual development. For two years she conducted a school in Cincinnati, O. She assisted ex-Governor Slade, of Vermont, in a plan for supplying women teachers in the great West. Miss Beecher was an intensely practical woman, earnest, patient, energetic, and of great good-humor. She did not approve of classical and modern music, neither was she an admirer of art. For many years she worked under the disadvantage of great physical weakness. In her youth she was a Presbyterian, but in after years she became a member of the Episcopal church.

BEECHER, CHARLES, son of Lyman, born at Litchfield, Conn., Oct. 7, 1815. He was educated at the Boston Latin School, the Lawrence Academy at Groton, Mass., Bowdoin College, and Lane Seminary. He became a minister and was installed pastor of the Second Presbyterian church at Fort Wayne, Ind., in 1844. The First Congregational Church, of Newark, New Jersey, was his next charge; and from here he went to the First Congregational Church in Georgetown, Mass. He spent seven years in Florida, and on his return was made pastor of a church at Wysox, Pa. Mr. Beecher is a fine musician, and assisted in compiling the *Plymouth Collection of Hymns and Tunes*. He has published *David and His Throne*, *Pen Pictures of the Bible*, *Autobiography and Correspondence of Lyman Beecher*, and a few other works.

BEECHER, EDWARD, son of Lyman, born at East Hampton, L. I., Aug. 27, 1803. He graduated at Yale in 1822, and studied theology at Andover Theological Seminary and at New Haven. He was called to the Park Street Church, of Boston, where he remained for four years, and then was tendered the presidency of Illinois College at Jacksonville. Subsequently he was pastor of the Salem Street Church in Boston, and the Congregational Church at Galesburg, Illinois. Chicago Theological Seminary called him to the chair of exegesis. In 1872 he left the ministry and removed to Brooklyn, N. Y. He has been a constant writer for journals, and was editor of the "Congregationalist" for six years. He wrote two books, *Conflict of Ages*, and *Concord of Ages*, which created considerable discussion from the fact that he advanced the theory that "man's present life is an outgrowth of a former life as well as a prelude to a future one." He has published sermons, addresses and several religious books.

BEECHER, EUNICE WHITE BULLARD, wife of Henry Ward Beecher, born at West Sutton, Worcester county, Mass., Aug. 26, 1812. She received her education at Hadley, Mass., and after a seven years' engagement she married Mr. Beecher, and went to live in Lawrenceburg, Ind. In her early married life she wrote the story, *From Dawn to Daylight*. She has since published *Motherly Talks with Young Housekeepers*, *Letters from Florida*, *All Around the House*, and *Home*, and since her husband's death she has been engaged on a series of articles for the "Ladies Home Journal," entitled, *Mr. Beecher as I Knew Him*.

BEECHER, GEORGE, son of Lyman, born at East Hampton, L. I., May 6, 1809, died at Chillicothe, Ohio, July 1, 1843. He was a graduate of Yale, studied theology, and served successively as pastor of Presbyterian churches at Rochester, N. Y., and Chillicothe. His death was caused by the accidental discharge of a gun.

BEECHER, HARRIET. See STOWE, Harriet Beecher. in those Revisions and Additions.

BEECHER, HENRY WARD, the most famous son of Lyman Beecher, born at Litchfield, Conn., June 24, 1813, died at Brooklyn, N. Y., March 8, 1887. His studies were pursued at the Boston Latin School, Mount Pleasant Institute, Amherst College, and Lane Seminary. He was first installed as pastor of the Presbyterian Church at Lawrenceburg, Ind., in 1837. About this time he married Eunice White, the daughter of Dr. Artemas Bullard. From 1839 to 1847 he preached at Indianapolis, and then was called to the pastorate of the new Congregational Church at Brooklyn, N. Y. Mr. Beecher soon acquired the reputation of being a great pulpit orator. He had a flexible voice, was fond of using illustrations, his good-humor was inexhaustible, and he was fearless in denouncing social and political evils. All these qualities contributed to make the pastor of Plymouth Church exceedingly popular. In 1882 Mr. Beecher disavowed his belief in eternal punishment. As a platform lecturer Mr. Beecher's services were in great demand, and his sermons were for years published under the title of *Plymouth Pulpit*. He was an active supporter of the Republican party until 1884, when he voted for the Democratic nominee for the presidency. At the centennial anniversary of the birth of Robert Burns (Jan. 1859), Mr. Beecher was requested to deliver the oration, and this has been considered one of his most eloquent speeches. He delivered the oration at Fort Sumter in 1865, on the anniversary of its surrender. In 1878 he was elected chaplain of the 13th Regiment, National Guards, State of New York. When Henry W. Sage founded the "Lyman Beecher Lectureship" in Yale, Mr. Beecher gave the first three courses. In 1874 arose the "Tilton and Beecher scandal," which, when brought into church trial, resulted in Mr. Beecher's favor. Mr. Tilton carried the matter into the civil courts, but the jury disagreed, standing nine to three in Mr. Beecher's favor. Mr. Beecher at one time edited the "Cincinnati Journal," and afterwards the "Farmer and Gardener," the "New York Independent" (for about 20 years) and the "Christian Union." His list of published books is a long one. Some of the best known are *Star Papers*, *Lectures to Young Men*, *Aids to Prayer*, *Norwood* (a novel), *Yale Lectures on Preaching*, and *A Life of Christ*. He printed the *Plymouth Collection of Hymns and Tunes*, and from his pulpit discourses were compiled the books, *Life Thoughts*, *Notes from Plymouth Pulpit*, *Comforting Thoughts*, and others.

BEECHER, JAMES CHAPLIN, son of Lyman, born at Boston, Mass., Jan. 8, 1828, died at Elmira, N. Y., Aug. 25, 1886. He graduated at Dartmouth in 1848, and afterwards pursued his theological studies at Andover, being ordained a Congregational minister in 1856. He was chaplain of the Seamen's Bethel in Canton and Hong-Kong, China, until 1861, and in 1861-62 chaplain of the first New York Infantry. He was lieutenant-colonel of the 141st (1862-63), colonel of the thirty-fifth U. S. colored troops (three years), and in 1866 was mustered out of service as brevet brigadier-general. After the war he held pastorates at Owego, Poughkeepsie and Brooklyn, N. Y. He became insane, and after three years of suffering committed suicide at Elmira.

BEECHER, LYMAN, born in New Haven, Conn., Oct. 2, 1775, died in Brooklyn, N. Y., Jan. 10, 1863. He was the descendant of a New England family, whose original ancestors settled in New Haven in 1638. His father was a blacksmith, and, in consequence of his mother's death, he was adopted by his uncle, Lot Benton. Rev. Thomas Bray fitted him for college, and he graduated from Yale in 1797. Having pursued the study of theology during his



college term, he was licensed to preach a year later, and began his clerical labor in the Presbyterian Church at East Hampton, L. I., where he remained for eleven years. He had married Roxana Foote, and as his salary was only \$400 a year, his wife taught a private school to assist in the support of the family. He was obliged to resign his charge and move to Litchfield, Conn., where he could get a better salary. Here he remained for sixteen years, winning fame by his eloquent sermons and his fearless denunciations of intemperance. The Hanover Church of Boston called him to its pastorate. This was a time of religious controversy, for Dr. Channing had broken with Congregationalism, and many people were following his lead. In this controversy Dr. Lyman Beecher took an active part, warmly upholding Puritan doctrine. After remaining here six years he was called to the presidency of the new Lane Theological Seminary, near Cincinnati and the pastorate of the Second Presbyterian church of that city. The question of slavery began to be discussed in the seminary, and, as many of the students were from the South, the debate became violent. The trustees forbade further discussion, and all the students left the seminary. Some were induced to return, but this secession destroyed the prosperity of the seminary, and Dr. Beecher was unable to build it up again. In 1835 he was tried on the charges of heresy and hypocrisy by some of the more rigid Calvinists, but was acquitted. Leaving Lane Seminary in 1842, he returned to Boston and gave up his time to the revision of his books. The last years of his life were spent in Brooklyn, at the home of Henry Ward Beecher.

BEECHER, THOMAS KINNICT, a noted American divine, son of Lyman Beecher, was born in Connecticut in 1824, and was educated under his brother Edward, president of Illinois College. He taught school for some time, and in 1852 he organized a Congregational church in the eastern division of Brooklyn. Since 1854 he has been pastor of the Park church in Elmira. During the civil war he was for a time chaplain of a regiment of volunteers. He has traveled extensively in Europe and America, and has published a few books on religious subjects. He is noted as a philanthropist, and is greatly beloved by all who know him.

BEECH-HOPPER, a coleopterous insect of the weevil family. They lay their eggs between the surfaces of the leaves, and thus inflict much damage, especially to beech trees.

BEECH-OIL, the expressed oil of the mast or nut of the beech tree. In some parts of France it is used instead of butter.

BEECHEY, SIR WILLIAM, R. A., a fashionable portrait painter, born at Burford in December, 1753. His works are generally vigorous, but are wanting in grace and dignity. He was a good but not an eminent portrait painter. He died January, 1839, at the advanced age of eighty-six.

BEEDEE, the capital of a district of the same name in the Nizam's territories, about seventy-five miles to the northwest of Hyderabad, being in latitude 17° 53' north, and longitude 77° 36' east. It stands near the right bank of the Manjera, a considerable tributary of the Godavary, and occupies a tableland about 2,400 feet above the sea, and 100 feet above the adjacent country. Though it was formerly a place of grandeur and importance, yet it is at present chiefly remarkable for its manufactures in a compound metal made up of twenty-four parts of tin to one of copper.

BEE-EATER (*Merops*), a genus of birds found in Asia, Africa, and Southern Europe. They are nearly allied to the kingfishers, have rather long,

slightly arched beaks, long, pointed wings, and are mostly of a green color. In flight they resemble the swallow, and, like that bird, they feed on insects, but chiefly on bees and wasps.

BEEF-EATERS, a term applied to certain English functionaries, the yeomen of the Royal Guard, who have formed part of the train of the sovereign since the time of Henry VII., on state occasions. The wardens of the Tower of London are well known as "the Queen's Beef-eaters." Their costume or livery has been the same for four centuries, with the exception of some slight changes made in 1858.

BEEF-EATERS, a genus of birds of the order *Insectores*, tribe *Conirostres*, to which the name ox-pecker is more correctly given. They have short bills, square at the base, and rather swollen at the point. They are accustomed to sit on the backs of buffaloes, camels, and other large animals, and feed upon the larvæ of gaddies, which they find in their hides. They are exclusively African. Livingstone mentions that, the sight of the bird being much more acute than that of the buffalo, it is much more easily alarmed by the approach of danger, and the buffaloes always begin to look about when the birds rise from their backs.

BEEF, SUPPLY OF, IN THE UNITED STATES. See *Britannica*, Vol. I, pp. 387-91. The United States official statistics show a gradual increase both in number of cattle and beef products. In 1889 the total number of cattle was 49,417,101, and a large increase for every year of the decade. The number of milch cows was 15,300,934, and of other cattle 34,116,167. The number and value of beef cattle and value of beef products exported to other countries during the same year had reached the following totals: Number of live cattle exported, 140,208; number of pounds of canned beef, 51,025,254; fresh beef, 137,895,391; salted or cured beef, 55,200,435; tallow, 77,844,555; these products having a total value of \$22,860,240.

Mulhall's Dictionary of Statistics, issued in 1886, reported the figures of the following comparative table of production and consumption of beef per annum in various countries of the world:

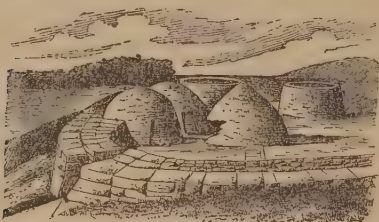
| Countries.                             | Production in tons. | Consumption in tons. | Consumption, pounds per inhabitant. |
|----------------------------------------|---------------------|----------------------|-------------------------------------|
| United States.....                     | 1,750,000           | 3,060,000            | 62                                  |
| United Kingdom.....                    | 666,000             | 1,640,000            | 52                                  |
| France.....                            | 550,000             | 1,210,000            | 40                                  |
| Germany.....                           | 785,000             | 1,405,000            | 40                                  |
| Russia.....                            | 1,050,000           | 1,220,000            | 24                                  |
| Austria.....                           | 655,000             | 1,090,000            | 37                                  |
| Italy.....                             | 165,000             | 295,000              | 12                                  |
| Spain and Portugal.....                | 170,000             | 460,000              | 16                                  |
| Belgium.....                           | 82,000              | 190,000              | 44                                  |
| Holland.....                           | 95,000              | 98,000               | 42                                  |
| Denmark.....                           | 80,000              | 76,000               | 31                                  |
| Sweden and Norway.....                 | 150,000             | 196,000              | 48                                  |
| Greece.....                            | 12,000              | 31,000               | .....                               |
| Roumania, etc.....                     | 160,000             | 300,000              | .....                               |
| Canada.....                            | 135,000             | 198,000              | 52                                  |
| Total in Europe, Canada, and U. S..... | 6,505,000           | 12,169,000           | .....                               |

The same authority estimates the production of beef in Australia and in the Argentine Republic in the same year at 650,000 tons. See also *FOOD AND MEAT*, in these Revisions and Additions.

BEEF TEA, a light and pleasant article of diet, principally for the sick, is made from lean beef cut into small pieces and allowed to stand some time in cold water, and then set over a slow fire, where

it will simmer without boiling. A little salt should then be added.

**BEEHIVE-HOUSE**, or **HUT**, the name popularly applied to dome-shaped buildings in Ireland, considered the most ancient architectural remains in that country. They are round, of medium size and height, constructed of long, thin stones arranged,



BEEHIVE-HOUSES.

without cement, in horizontal layers slightly overlapping, and so gradually converging until they meet at the top. The square-headed doorway, as in the Egyptian style, narrows toward the top. See *Britannica*, Vol. II, p. 384; Vol. III, p. 397.

**BEER**, **ADOLF**, an Austrian historical writer, born in Moravia in 1831. He was professor of history successively in several institutions of learning, notably the technical high school in Vienna, where most of his historical works, and the results of his extensive travels, have been written.

**BEER-MONEY**, a peculiar payment to private soldiers in the English army. It was established in 1800, at the suggestion of the Duke of York, and consisted of one penny per day for troops when on home-service, as a substitute for an issue of beer and spirits. It still continues as an addition to the daily pay, and something in the mode of keeping military accounts induces the authorities to allow it to figure as a separate item, instead of being consolidated with the other elements of a soldier's pay.

**BEERSHEBA SPRINGS**, a fashionable watering place of Tennessee, situated on a spur of the Cumberland Mountain, near McMinnville. It is noted for its saline and chalybeate springs and its beautiful scenery.

**BEESHA**, a genus of grasses with the habit and most of the characters of bamboos, but remarkable for the fleshy pericarp which incloses the seed, forming a sort of berry. The species are few and are natives of the East Indies.

**BEESTINGS**, sometimes written **BRETINGS**, the first milk yielded by a cow after calving; also formerly applied to the disease caused by drinking such milk.

**BEESWAX**, the wax which is secreted by bees, and of which their cells are constructed. See *Britannica*, Vol. III, p. 486; Vol. XXIV, p. 459.

**BEESWING**, a film which resembles the wing of a bee, and which appears upon certain old wines, especially port. The wine itself is often called beeswing, or is said to be beeswinged, referring to its age.

**BEE-FLY**, an insect which infests crops of mangold-wurzel, and other kinds of beet, depositing its eggs on the leaves, the soft parts of which the larvæ devour, causing them to assume a blistered appearance, and, when numerous, injuring the health of the plants. It is a two-winged insect of the family *Muscidae*, but not so large as the common house-fly.

**BEE-LE-STONES**, the name given by the lapidaries of Edinburgh, to hard nodules of clay iron-

stone, found abundantly in a low cliff, composed of shale, at Newhaven, near Leith, or strewn upon the beach in that neighborhood. They take a beautiful polish, and have been employed to make letter-weights, and other ornamental articles. Some of the nodules contain fossil fish, and some a fossil of vegetable origin. See *CORALITES*, *Britannica*, Vol. VI, p. 353.

**BEE-FLING**, a finishing mechanical process, applied originally to linen shirting, and afterwards to cotton shirting, in imitation of linen, to give the cloth a hard and wiry look, by flattening the yarn irregularly in an angled manner. Beetling is likewise a process in flax-dressing, to separate the woody from the flexible fibers of the plant.

**BEE-ROOT SUGAR**, the sugar which is obtained from the beet, but which, although similar to cane sugar, is inferior in sweetening power. Beet root contains an average of about ten per cent. of saccharine matter, and sugar-cane eight percent. more; the white Slesvig beet yields the best sugar. See *Britannica*, Vol. I, p. 381; Vol. XXII, pp. 626, 627.

**BEE-ROOT SUGAR**. In 1889-90 the total yield of beet sugar for the year was over 3,600,000 tons. The German product was 1,250,000 tons, the French 750,000 tons, Russia 480,000 tons, Austria-Hungary 730,000 tons. The total product was nearly 50 per cent. more than that of 1887-88. Only a small amount of the total product was reported by the United States. Indeed, the sugar-beet culture in this country is only just beginning as a great industry. The immediate future, however, is full of promise. Investigations by the Agricultural Department in Washington in respect to the production of sugar from the sugar-beet have been of the most extensive nature. During the early spring of 1890, 5,000 packages of sugar-beet seed of the most approved varieties were obtained from European growers and sent to all persons in the country who had applied for them. Arrangements were also made by which the beets, after maturity, could be sent to the Department for analysis. As a result of this arrangement beets were received from about one thousand different localities in all parts of the country, and these were analyzed in the laboratory. The results of the analysis are, for the most part, extremely favorable, especially with those varieties which came from the northern and central portions of the country. It is not uncommon to find beets containing 15 per cent. of sugar, while in exceptional cases the percentage of sugar has risen as high as 20. Many beets were found of a strictly typical character, combining a perfect shape with the proper weight and a high content of sugar. A typical sugar-beet is conical in shape, smooth in its external contour, with a white, solid interior, weighing about one pound, and having a content of sugar of about 14 per cent. Many samples of such beets were received by the Department, showing that it is possible to produce in the United States sugar-beets of the highest type.

A large beet sugar factory has been erected at Grand Island, Nebraska, equipped with the most approved modern machinery, and this factory is now working sugar-beets at the rate of 300 tons per day. There is every reason to believe that the encouragement which has been extended to the sugar-beet industry, by the investigations of the Department and by act of Congress, will result ere long in the establishment of many additional sugar factories in those portions of the country which the data obtained by the Department show to be best suited for the purpose. When it is considered that 250 beet sugar factories of the size and capacity of those now in operation in California and Nebraska



will be sufficient to make one-half of the total sugar consumed in the United States, it is not idle to expect that in the course of a few years a large proportion of the sugar consumed in this country will be made from the sugar-beet.

An intelligent observer of the rapidly growing interest now developing in several States on this subject, expresses the opinion that in five years the people of the United States will produce all the sugar needed for the home supply.

BEETS, NICOLAËS, a Dutch poet, was born at Haarlem in 1814. He became pastor of a church at Heemstede, in 1838; in 1854 he removed to Utrecht, where, in 1875, he was appointed to the chair of theology in the university. Besides his poems he is the author of numerous literary and religious works. See *Britannica*, Vol. XII, p. 98.

BEFFANA, a corruption of *Epiphania* (Epiphany), and the name applied to a peculiar Italian custom prevailing on Three Kings' Day, or Twelfth Night. Tradition says that the Beffana was an old woman who, being busily engaged in house-cleaning when the three wise men of the East passed by on their way to offer their treasures to the infant Saviour, excused herself for not going out to see them, on the ground that she would have an opportunity of doing so when they returned. She, not knowing that they went home by another road, has been ever since watching for them. She is supposed to take a great interest in children, who, on Twelfth Night, are put to bed early, a stocking of each being hung before the fire. Soon the cry *Ecco la Beffana* is raised, when the children jump up and seize their stockings, each of which contains a present bearing some proportion in value to the conduct of the child during the year. One whose behavior has been particularly bad finds his stocking filled with ashes, in token of the Beffana's displeasure. There was a custom in Italy of carrying an effigy called the Beffana, on Twelfth Night, in procession through the streets, with much demonstration; it was probably the relic of one of the "mysteries" of the Middle Ages.

BEFFROI, the name of a tower used in the military sieges of ancient or medieval times. When a town was to be besieged, this beffroi, which was movable, and as high as the walls, was brought near it. These towers were to cover the approach of troops, the highest being from twelve to fifteen stories, or stages, placed upon six or eight wheels. They were often covered with rawhides to protect them from the boiling grease and oil directed against them by the besieged. At the top there was a hinged drawbridge, to let down upon the parapet of the wall to aid in landing. Cæsar used this tower in his campaigns in Gaul.

BEG, or BEX, a Turkish title, rather vague in its import, and commonly given to superior military officers, ship-captains and distinguished foreigners. More strictly it applies to the governor of a small district, who bears a horse-tail as a sign of his rank. "Beglerbeg," or, more correctly, *Beilerbegi* (lord of lords), is the title given to the governor of a province who bears three horse-tails as his badge of honor, and has authority over several begs, agas, etc.

BEGGAR, one who solicits charity from the public. The word is supposed to have some connection with the fraternity known as Beghards. Begging, however, became so conspicuous a feature among these mendicant orders that the term originally applied to their sacred duties seems early to have acquired its modern vulgar acceptance. In a civilized, industrious country, the beggar, to have any chance of relief, must succeed in making the impression, whether true or false, that he is in actual

need of alms to keep him from starving. Among Oriental nations, on the other hand, this class is rather considered as endowed with the privilege of taxing their fellow-men than as objects of compassion. It has sometimes been supposed that a residue of this feeling of superiority characterizes the mental physiology of the mendicant of civilization, and that, abject as he seems, he considers himself to some extent a privileged person entitled to support without toiling as do the working classes. In Europe, during the Middle Ages, those doctrines of Christianity which teach the abjuration of selfishness and worldly-mindedness were exaggerated into profession of total abstraction from worldly cares and pursuits. Hence arose the large body of religionists, who, as hermits, or members of the mendicant orders, lived on the contributions of others. Later on these orders became the proudest and richest of the clergy; but while the chiefs lived in affluence the practices of the lower adherents fostered throughout Europe an injurious system of mendicancy.

BEGGAR-MY-NEIGHBOR, a game of cards usually played by two persons, between whom the cards are divided.

BEGHARMI, or BAGIRMI, a country of Central Africa, about 240 miles in length, and 150 miles in breadth. Begharmi proper is flat, slightly inclining toward the north, its general elevation being about 1,000 feet above sea level. From the numerous deserted villages in the country it appears that the population was once much greater than at present. The people are grossly superstitious; many are pagans, although Mohammedanism has been introduced among them.

BEGKOS, or BEIKOS, a large village of Anatolia, on the Bosphorus, eight miles from Scutari, said to be the place of the contest between Pollux and Amycus, in which the latter was killed. At the commencement of the Crimean war the allied fleets anchored in Begkos Bay, prior to their entering the Black Sea in 1854.

BEGONIA, a genus of exogenous plants, typifying the natural order *Begoniaceæ*, and found in nearly all warm regions. The various species are extensively cultivated on account of the brilliancy of their flowers. The stalks of certain species are used in cookery. Some species, also, are used as purgative medicines. See *Britannica*, Vol. XII, p. 265.

BEGONIACEÆ, a natural order of exogenous plants, named in honor of Michael Bégon, a French patron of science. They are herbaceous, with alternate leaves, which are oblique at the base and

have large dry stipules; the flowers are in cymes, unisexual, the perianth colored, with four unequal divisions in the male flowers, and five or eight in the female; the stamens are numerous; the fruit is membranous, winged, three-celled, bursting by slits at the base, the seeds minute. The order contains 160 known species, all of which have pink flowers.

BEGONIELLA, a genus of exogenous plants of the natural order *Begoniaceæ*, indigenous to the United States of Colombia.

BEG-SHEER, a fresh-water lake of Asia Minor. Karamania, 44 miles southwest of Koniye, pre-



BEGONIACEÆ.

sumed to be the ancient *Caralitiss*. It is about 20 miles long and from 5 to 10 miles broad. It contains many islands and discharges itself by a river of the same name into Lake Soglah. On its east and north shores are the towns of Begshehr and Kereli, the old *Caralitiss*, which issued imperial coins, and which is also supposed to have occupied the site of Pamphylia.

BEGTASHI, a religious order in the Ottoman Empire, which had its origin in the 14th century. The name is believed to be derived from that of a celebrated dervish, Hadji Begtash, to whom also the order appears to owe its institution. The members use secret signs and pass-words resembling those of Freemasonry. Although numbering many thousands of influential persons in its ranks, the society does not appear to exercise any material influence in the religion or politics of Turkey.

BEGUM, a princess or lady of high rank in the East Indies. The term was brought into prominence among English-speaking people by the trial of Warren Hastings; one of the charges against whom was that of cruelty to two begums, who, being offered by him the alternative of lifting their veils before a stranger or losing their wealth, religiously chose to give up their treasures.

BEHAÏM, MARTIN, a well-known navigator. See BEHEM, Britannica, Vol. III, p. 509.

BEHAM, BARTHEL (1502-1540), a German artist whose earlier works are quite in the manner of Albrecht Dürer. His portraits of the Emperor Charles V and his brother, the Emperor Ferdinand I, are well known for their fine conception and masterly treatment.

BEHAM, HANS SEBALD (1500-1550), a German artist, brother of Barthel, from whom he first received instructions in painting and engraving, and then of Albrecht Dürer. He possessed singular powers of invention, generally exercised on secular, and often on coarsely humorous subjects, occasionally also on those of a vulgar and indecorous class.

BEHM, DR. ERNST, a German geographer, born at Gotha, Jan. 4, 1880, died there March 15, 1884. In 1856 he became Dr. Petermann's chief assistant in editing the famous geographical periodical, *Mitteilungen*, to the editorship of which he succeeded on his chief's death in 1878. In 1872 he commenced, in conjunction with H. Wagner, the useful *Bevölkerung der Erde*, intended as a statistical supplement to the *Mitteilungen*; and from 1876 he had charge of the statistical department of the *Almanach de Gotha*.

BEHRING. See Britannica, Vol. III, pp. 509-10; and Vol. XIX, p. 318. See also BEBING, IVAN IVANOVICH, in these Revisions and Additions.

BEILAN, a pass and town in the northern extremity of Syria, on the east shore of the Gulf of Iscanderoun. It is one of the two passes, supposed to be the lower one, mentioned by Cicero as capable of easy ascent on account of their narrowness. There seems to be no doubt that in the war between Darius and Alexander the Beilan Pass was an important consideration to both commanders. It has a population of 5,000, many of whom are wealthy, and is much esteemed for its salubrity and fine water, which is supplied by numerous aqueducts. It was a scene of battle between the Egyptians and Turks in 1832, when the latter were defeated.

BEIRAM, or BAIKAM, a Mohammedan festival, somewhat analogous to Easter. See Britannica, Vol. III, p. 246.

BEIT, an Arabic word, signifying house, abode or place, the equivalent of which in Hebrew is *Beth*. Thus we have in the former language *Beit-al-Haram*, "the house of the sanctuary," or "the sacred house," and in the latter *Beth-el*, "house of God."

BEITH, a thriving inland town in the county of Ayr, Scotland, nine miles southwest of Paisley. Here cotton and muslin are manufactured, and in the neighborhood the famous Dunlop cheese is made.

BEITULLAH (Arab., House of God), the spacious building or temple at Mecca, which contains the Kaaba.

BEJAN, the name of the first or "freshman" class in some of the Scotch universities, and, of old, in many on the continent. The word is believed to be derived from the French *bec-jaune*, or yellow neb, a term used to designate a nestling or unfledged bird. In the University of Vienna the *bejan* was called *beanus*, a word of the same meaning and no doubt the same origin.

BEJAPUR. See BIIAPUR, or BIIAIRPUR, Britannica, Vol. III, p. 669.

BEKAA, the Coele-Syria of the ancients, the "Plain of Lebanon" of the old Testament, and El Bekaa of the natives of Syria. It is inclosed between the parallel ranges of Lebanon and Anti-Lebanon, and is the richest and most beautiful plain of Syria, but although the soil is good and water abundant from the numerous mountain springs, a very small portion of it is cultivated.

BEK, ANTHONY, Bishop of Durham from 1283. He took a prominent part in the Scottish wars of Edward I, and held a command at the battle of Falkirk. In 1300 he became involved in ecclesiastical disputes, which lasted till his death, March 8, 1311. He was a prelate of great magnificence and unbounded ambition.

BETASHI, a mendicant order of dervishes, which had its origin in the 14th century.

BELAYING, one of the many modes of fastening ropes on shipboard. It is effected by winding a rope, generally a part of the running rigging, round a piece of wood called a cleat or a kevel, or else round a belaying pin, which is an ash staff from 12 to 16 inches in length.

BELCHER, SIR EDWARD (1799-1877), a noted English naval officer. He was appointed in 1825 assistant surveyor to the expedition about to explore Bering Strait under Captain Beechey. He was made commander in 1829, and seven years later he was placed in charge of the *Sulphur*, bound for the western coasts of America and the Indies, on a tour of exploration. He returned within six years, during which time he had circumnavigated the globe, and rendered valuable aid in the Canton River to Lord Gough, whose successes over the Chinese were greatly due to Belcher's soundings and reconnaissances pushed into the interior.

BELCHTE, a town of Spain, in the province of Saragossa, about 22 miles from the city of that name, celebrated as the place, where, in 1809, the French under Suchet completely routed the Spanish under General Blake, capturing all their guns, with a loss of only forty men.

BELED-EL-JEREED, an extensive arid and sterile region lying east of Morocco, and stretching from Algeria on the north to the Sahara Desert on the south. It receives its name, meaning the "country of dates," from its one scanty production.

BELEM, a city of Brazil, on the right bank of the Para, the most southerly arm of the estuary of the Amazon.

BELEMNITES (Gr., *belemnion*, a dart or arrow), an interesting genus of fossil cephalopodous *Mollusca*, the type of a family called *Belemnitidae*, to the whole of which the name belemnites is very generally extended, and which are closely allied to the *Sepiidae* or cuttle family. See Britannica, Vol. XV, p. 676. No recent species of this mollusk is known; fossil species, found in all the oolitic and cretaceous



ous strata, from the lowest lias to the upper chalk, are very numerous. These remains are generally those of the shell alone, an internal shell, entirely included within the body of the animal, like that of the cuttle. The most perfect specimens have a double shell, consisting of a conical chambered portion (the *phragmocone*) inserted into a longer solid, somewhat conical or tapering and pointed sheath.

BELEMNITIDÆ, a family of extinct cephalopodous mollusks, typified by the genus *Belemnites*. It includes also the genera *Belemniteuthis*, *Belemnitella* and *Xiphoteuthis*.

BELFAST, a city of Maine, county-seat of Waldo county, and a port of entry. It is beautifully situated on a hillside overlooking Belfast Bay, about 30 miles south of Bangor. The harbor is deep, wide, and safe. The principal industries are ship-building, fishing, and the manufacture of paper, shoes, and iron.

BELFRY (Fr., *beffroi*), a word of doubtful origin;

a bell-tower, or turret, usually forming part of a church, but sometimes detached from it, as at Evesham and Berkeley, in England, and still more frequently in Italy. A belfry belonging to a church situated in a deep glen was built upon a neighboring height, as at Ardsclach, Scotland, and at St. Feve and



other places in Cornwall. At the close of the 17th century, it was a common thing in Scotland for the bell to be hung upon a tree, as at Aldbar, for instance. A belfry consisting of a mere turret, is called a *bell-gable*, or *bel-cote*, and always stands on the west end of the church. A smaller one is sometimes placed at the east end over the altar for the sanctus bell. After the 12th century, when the burghs began to gain influence, they asserted their right to have bells to call the burghers together for council or for action. Thus in the hearts of towns there arose municipal belfries.

BELGÆ, a name given by Cæsar to the warlike tribes which in his time occupied one of the three divisions of Gaul. Their country was chiefly level, lying between the Rhine and the Seine, and comprised modern Belgium, part of the Netherlands, and northeastern France. They were in all probability, chiefly of Celtic origin. See *Britannica*, Vol. IX, p. 527; Vol. X, p. 111.

BELGARD, a Prussian town, almost entirely surrounded by water, in the province of Pomerania, at the junction of the Leitznitz and the Persante, about sixteen miles southwest of Cöslin. It has an old castle and the inhabitants manufacture cloth.

BELGIOJOSO, a town of Lombardy, North Italy, pleasantly situated in a fruitful plain between the Po and the Olona, nine miles east of Pavia. It has a noble castle, in which Francis I spent the night previous to the disastrous battle of Pavia, in which he was made prisoner. Population, about 4,000.

BELGIOJOSO, CHRISTINA, PRINCESS OF (1808-1871), an Italian patriot who was twice exiled for taking an active part in revolutionary measures. In 1848 she equipped a cavalry force of 200 men at her own expense to assist in freeing Milan from the Austrian yoke. She was also a patroness of literature and art.

BELGOROD (Russian, *Bejelgorod*, "White Town,"), a town in the government of Koursk, Russia, situated on the Donetz. Three important fairs are held here yearly. Population, 15,200.

BELGRAVIA, the most aristocratic part of the West End of London, the English metropolis, extending from Hyde Park Corner to Piccadilly.

BELGIUM. Area, 11,373 square miles. Population (1888), 6,080,043; average population per square mile (1888), 530. Under its present constitution, adopted in 1830-31, Belgium is very properly classed as a limited monarchy. Capital, Brussels. For an elaborate article on the history, productions, and the changes in its constitution and for local map, see *Britannica*, Vol. II, pp. 514-31.

In 1830, a national congress proclaimed Belgium independent. Prince Leopold, of Saxe-Coburg, was chosen hereditary king, June 4, 1831. He died Dec. 10, 1865, and was succeeded by his son, Leopold II, who was born April 9, 1835. Under the reign of the latter remarkable prosperity has characterized the country. He will be especially remembered as the founder and patron of the Congo Free State, for his vigorous, most efficient support of Stanley's work in Central Africa, and for his influential efforts on behalf of the suppression of the African slave-trade. The king has been granted an annual civil list of \$660,000.

The king is the head of the executive power, but every official act must be countersigned by a responsible department minister, and the chambers are the sole interpreters of the constitution. The king's person is sacred; he transmits his power to his next male heir, and, in default of a male heir, he may nominate a successor, subject to the approval of the chambers. He may not suspend laws or dispense with their execution. He commands the land and sea forces, declares war, negotiates treaties of peace, alliance and commerce, which, however, must have the sanction of the chambers. The house of representatives is composed of one member for every 40,000 of the population, and the voters are those male citizens of not less than 25 years of age whose annual taxation is not less than 42 francs. The deputies not residing in Brussels are entitled to the pay of about \$84 per month while the chamber is in session. The senators, elected for eight years, number about half as many as the lower house, elected for four years; must be 40 years old and pay an annual tax of at least 1,000 florins. They are not entitled to any compensation for their services. In 1890 the senate numbered 69 members, and the representatives 136. For fuller notice, see *Britannica*, Vol. II.

The army, on a paid footing, in 1888 numbered 50,000 men with officers, under the colors, while the total force upon paper, available in emergency, was reported at 154,638. Exemption can no longer be obtained by purchase. Antwerp has the principal fortress. In 1888 the chambers voted \$1,920,000 for new forts on the Meuse, the new forts to be armed with guns placed in iron cupolas. Belgium has no navy proper, nor has it any colonies; but the king of the Belgians is, at the same time, "sovereign of the Free State of the Congo." In 1888 Brussels reported a population of 448,088; Antwerp, the chief port, 210,000, exclusive of suburbs; Ghent, 147,281, and Liege, 144,000.

The record of the Belgian royal family, as officially gazetted January 1, 1891, was as follows:

*Reigning King*.—Leopold II, born April 9, 1835, the son of King Leopold I, former Prince of Saxe-Coburg-Gotha, and of Princess Louise, daughter of the late King Louis Philippe of the French; ascended the throne at the death of his father, Dec. 10, 1865; married, Aug. 22, 1868, to Queen Marie Henriette; born Aug. 23, 1866; the daughter of the late Archduke Joseph of Austria.

*Children of the King*.—I. Princess Louise, born Feb. 18, 1858; married, Feb. 4, 1875, to Prince Philip of Saxe-Coburg-Gotha; born March 28, 1844; eldest son of Prince August, cousin of the reigning duke, and Princess Clementine of Orléans, daughter of the late King Louis Philippe of the French. II. Princess

**Stéphanie**, born May 21, 1864; married to the late Archduke Diédo Rudolf, only son of the Emperor of Austria and King of Hungary, May 10, 1881; widow 1889. **III. Princess Clémence**, born July 30, 1872.

**Brother and Sister of the King.**—**I. Philippe**, Count of Flanders, born March 24, 1837; lieutenant-general in the service of Belgium; married April 26, 1867, to Princess Marie of Hohenzollern-Sigmaringen; born Nov. 17, 1845. Offspring of the union are four children: 1. Prince Baudouin, born June 8, 1869. 2. Princess Henriette, born Nov. 30, 1870. 3. Princess Josephine, born Oct. 18, 1872. 4. Prince Albert, born April 8, 1875. 11. Princess Charlotte, born June 7, 1840; married July 27, 1857, to Archduke Maximilian of Austria, elected Emperor of Mexico July 10, 1863; widow June 19, 1867.

Since the above was gazetted, Prince Baudouin, nephew of the king and heir-apparent to the throne, died Jan. 23, 1891, very suddenly, aged 21 years. By his death his brother, Prince Albert, becomes heir-apparent to the Belgian throne.

Elementary education is compulsory, and is aided by a state grant of nearly \$5 per head, on the basis of attendance. The education grant in 1887 was \$2,060,100 for elementary education, and \$1,090,425 for secondary and higher education. There are four great universities—Ghent and Liege, controlled by the state, Brussels and Louvain, independent. Louvain has the "logical faculties."

French is the principal official language, but the Flemish has also been made an official language. The census of 1880 showed that about 45 per cent. of the people spoke French, 40 per cent. Flemish, and eight per cent. both French and Flemish. The prevailing religion is the Roman Catholic, but all religions are free under the constitution.

In 1889 the soil was divided among 1,169,406 proprietors; of the total area 58 per cent. was under cultivation. The exports to Great Britain alone in 1889 were valued at \$88,374,385. The public revenue in 1890 was \$83,149,100; public expenditure in 1890, \$80,173,120. The total public debt in 1890 was \$497,997,175.

The following table shows the respective commercial relations of the various nations with Belgium. The figures are compiled in francs, and are from the official Belgian returns of 1888:

| Imports from—      | Francs.     | Exports to—        | Francs.     |
|--------------------|-------------|--------------------|-------------|
| France.....        | 289,010,139 | France.....        | 342,680,888 |
| Netherlands.....   | 216,415,703 | England.....       | 256,101,563 |
| Great Britain..... | 182,557,286 | Germany.....       | 200,127,708 |
| Germany.....       | 168,943,432 | Netherlands.....   | 172,020,189 |
| United States..... | 119,816,792 | United States..... | 162,208,494 |
| Russia.....        | 149,783,457 | Italy.....         | 24,296,197  |
| Roumania.....      | 90,867,109  | Switzerland.....   | 22,686,432  |
| British India..... | 55,915,890  | Argentine Rep..... | 21,718,999  |
| Argentine Rep..... | 54,798,633  | Spain.....         | 19,831,633  |
| Sweden-Norway..... | 48,194,626  | Brazil.....        | 13,795,940  |
| Peru.....          | 32,201,977  | Portugal.....      | 12,011,904  |
| Brazil.....        | 24,553,811  | Turkey.....        | 9,289,896   |
| Italy.....         | 18,829,785  | Sweden-Norway..... | 9,293,011   |
| Uruguay.....       | 15,248,859  | China.....         | 7,756,888   |
| Spain.....         | 10,976,538  | Russia.....        | 5,906,538   |
| Chile.....         | 8,445,851   | Roumania.....      | 5,627,869   |
|                    |             | British India..... | 4,667,116   |

The latest official reports (those of 1886) announced 2,755 of railway, 1,984 being the property of the state, with a gross revenue of \$19,200,000; the telegraphs had a length of 3,893 miles; navigable rivers a length of 684, and the canals 560 miles.

**BELGRADO, JAMES**, an Italian Jesuit and a distinguished antiquary and mathematician, born at Udine in 1704, died in 1789. He wrote numerous works in Latin and Italian, mostly on scientific subjects.

**BELIAL**, a Hebrew word, signifying idle, wicked, or unprofitable. The Scripture phrase, therefore, "Sons of Belial," was originally, in all probability, a mere Hebrew figurative expression, denoting

worthless or dissolute persons. At a later period the idea of evil which the word embodies seems to have been elaborated into a personality, and Belial is supposed by some to correspond to the Pluto of the Greeks.

**BELKNAP, CHARLES EUGENE**, member of Congress, was born in Massena, N. Y., Oct. 17, 1846; removed with his parents to Michigan in 1855; was educated in the common schools of Grand Rapids; left school in 1862, and enlisted in Twenty-first Regiment, Michigan Infantry; was promoted to different positions, and received a captain's commission at the age of seventeen years and three months; served until 1865, with the Army of the Cumberland; was wounded seven times; was elected to the Fifty-first Congress and reelected to the Fifty-second Congress in 1890.

**BELKNAP, GEORGE EUGENE**, naval officer, born in Newport, N. H., Jan. 22, 1832. He was appointed midshipman from that State in 1847, and had passed the various grades up to commander in 1866. In 1862-'64 he commanded the iron-clad *New Ironsides*, and his handling of this new kind of vessel was much praised by Admirals Dupont, Dahlgren and Porter. He was engaged in important service during the civil war, and commanded successively the *Seneca* and *Canonicus*, and after the war the *Hartford* and *Tuscarora*. On the last-mentioned steamer he engaged in deep-sea sounding, for the purpose of finding a route for a submarine cable between Japan and the United States. He was made commander in 1885.

**BELKNAP, WILLIAM GOLDSMITH**, an American soldier, was born in New York State in 1794. He fought bravely in the war of 1812 and in the Florida war; and was brevetted brigadier-general for conspicuous bravery in the Mexican war. He died in 1851. **WILLIAM WORTH BELKNAP**, his son, rose during the civil war from the rank of major to that of brigadier-general.

**BELL, ALEXANDER GRAHAM**, inventor, born in Edinburgh, Scotland, March 3, 1847; came to the United States in 1872. He introduced into this country the system of instruction for deaf mutes invented by his father, **ALEXANDER MELVILLE BELL**. But he is best known by his discoveries in connection with the transmission of sound. The first public exhibition of his telephone was given at Philadelphia in 1876, and he has since made many improvements in it. He is a member of several scientific societies, and has written extensively on electricity.

**BELL, ALEXANDER MELVILLE**, the inventor of "visible speech," was born in Scotland in 1819. He was for many years lecturer at the Edinburgh University, and for some years later at the London University College. He came to America in 1870, and was for many years connected with Queen's College, Kingston, Ontario. He removed to the United States in 1881, and settled in the city of Washington. He has written largely on elocution and on visible speech.

**BELL, CURRER**. See **BRONTË CHARLOTTE**, *Britannica*, Vol. IV. p. 364.

**BELL, HENRY GLASSFORD**, lawyer and man of letters, was born in Glasgow, Nov. 8, 1803. He attended Edinburgh University, studied law, passed as an advocate in 1832, and gained the acquaintance of the ruling literary spirits of that time in Edinburgh. He was appointed a sheriff substitute of Lanarkshire in 1839; in 1867 he succeeded Sir Archibald Alison as sheriff, and acquired the reputation of being the best Scottish mercantile lawyer of his day. He founded (1828) and was for three years editor of the "Edinburgh Literary Journal." He died Jan. 7, 1874.



**BELL, SIR ISAAC LOWTHIAN, F. R. S., D. C. L.,** officer of the Legion of Honor, born in 1816. He was educated at Edinburgh and Paris. After being engaged in extensive chemical works, he and his brothers founded the great Clarence iron smelting works on the Tees. He was the member of Parliament for Hartlepool from 1875 till 1880, and was made a baronet in 1885. He has written many papers on metallurgical and chemical subjects.

**BELL, JOHN,** a statesman, born near Nashville, Tenn., Feb. 15, 1797, died at Cumberland Iron Works, Tenn., Sept. 10, 1869. He was a graduate of the institution formerly known as Cumberland College. He studied law and became State senator in 1814. In 1827 he was sent to Congress, where he remained for seven terms. He was a free trader, but became a protectionist and a founder of the whig party. He was chosen speaker of the House in 1834, and took part in several important debates from 1836 to 1838. President Harrison, in 1841, made him secretary of war, but he resigned when President Tyler left the whig party. Mr. Bell was sent to the United States Senate after having spent several years in retirement. He opposed the policy of annexation, opposed the Lecompton constitution for Kansas, and was the nominee on the "constitutional union" ticket for President in 1860. Secession was a movement condemned by Senator Bell, but he was not in favor of "coercion."

**BELL, JOHN,** a sculptor, born in Norfolk, England, in 1811. The work by which he is best known in this country is his allegorical representation of the *United States Directing the Progress of the New World*, a copy of which, in terra-cotta, was sent to the Centennial Exhibition at Philadelphia, and afterwards to Washington. His *Andromeda Bound to the Rock* is the property of Queen Victoria. He has published a number of literary works, chiefly on sculpture and the allied arts.

**BELL, THOMAS,** born in England in 1792, died 1880; an eminent naturalist. He studied medicine at London, from 1814 to 1815, and in 1836 he was made professor of zoölogy at King's College in that city. In 1844 he became first president of the Ray Society.

**BELL OF A CAPITAL,** also called **BASKET**, the capital of a pillar denuded of the foliage, in which case it resembles the form of a bell reversed.

**BELLA,** a thriving town of Naples, in the province of Basilicata. Population, 6,000.

**BELLADONNA LILY,** a very beautiful species of *amaryllis*, with rose-colored drooping flowers clustered at the summit of the leafless flowering stem. It is a native of the Cape of Good Hope and of the West Indies; it has become naturalized in Madeira. The flowering stem is about 18 inches high.

**BELLAGGIO,** an Italian village situated on the promontory that separates the two arms of Lake Como. Its hotels are among the finest in Italy, and some of its lovely villas contain valuable art collections. Population, 966.

**BELLAIRE,** a commercial and manufacturing city of Ohio, situated on the Ohio River, about five miles below Wheeling. It contains important manufactures of glass, tinware, and flour, besides machine-shops, foundries and nail-works; and abundance of iron, coal, limestone and fire-clay are found in the vicinity.

**BELLAMY, EDWARD,** author, born in 1850 at Chicopee Falls, Mass. He was educated at Union College, studied in Germany for a year, and, on his return to America, he studied law and then turned his attention to journalism. During 1871-72 he was successively on the staff of the New York "Evening

Post" and of the "Springfield Union." He has written *A Nantucket Idyl*, *Miss Ludington's Sister*, *The Blind Man's World* and *Looking Backward*. The last mentioned is a very popular book.

**BELLAMY, JOSEPH,** a clergyman and educator, born at Cheshire, Conn., in 1719, died at Bethlehem, Conn., March 6, 1790. He graduated at Yale, and at the age of eighteen was licensed to preach. He spent his life preaching at Bethlehem, where, about 1742, he established a divinity school, which was most successful and was attended by many eminent men. Some of Dr. Bellamy's works are *True Religion Delineated*, *The Nature and Glory of the Gospel*, and *The Law Our Schoolmaster*.

**BELL-BIRD,** a bird of a genus nearly allied to the cotingas, but characterized by a very broad bill, soft and flexible at the base and hard toward the extremity. It is about the size of a jay; the male is of snow-white plumage. It is found in South America, and is remarkable for the metallic resonance of its cry, which resembles the tolling of a bell. It generally takes its place at the top of a lofty tree, and the tolling can be heard at the distance of three miles. It resounds through the forest not only in the morning and evening but also at mid-day, when the heat of the blazing sun has imposed silence on almost every other creature. See *Britannica*, Vol. XII, p. 139, and Vol. XXIV, p. 139.

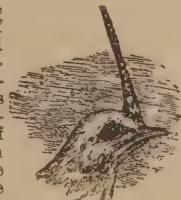
**BELL, BOOK AND CANDLE.** The excommunication by Bell, Book and Candle is a solemnity belonging to the Church of Rome. Two or three sentences from the conclusion of the form of excommunication in the Scottish Church previous to the Reformation explain its symbolism: "Cursed be they from the crown of the head to the sole of the foot. Out be they taken from the book of life. (Shuts the book.) And as this candle is cast from the sight of men, so be they souls cast from the sight of God into the deepest pit of hell. (Casts the candle on the ground.) Amen." The rubric adds: "And then, the candle being dashed on the ground and quenched, let the bell be rung"—the bell being tolled as for the dead.

**BELLE-ALLIANCE,** the name of a farm in the province of Brabant, Belgium, 13 miles south of Brussels. It has become famous as the position occupied by the center of the French army in the battle of Waterloo, 1815.

**BELLE-DE-NUIT,** a name given to a certain tropical species of *Convolvulacea*, with extremely beautiful and fragrant flowers, which open only during the night. The species to which perhaps the name more particularly belongs, is *Ipomœa Bona Nox*, the Moon Flower, or Evening Primrose, a native of the forests of the West Indies and of tropical America.

**BELLEFONTAINE,** a beautiful manufacturing town of Ohio, county-seat of Logan county, noted for its healthfulness, and as having the highest elevation of any town in the State. The manufactures are chiefly woolens, carriages and railroad cars.

**BELLEFONTE,** a town of Pennsylvania, county-seat of Centre county, beautifully situated on Springfield Creek, at the foot of Bald Eagle Mountain. It contains important manufactories of railroad cars, glass, axes, printing presses and other machinery, and a number of foundries, furnaces and rolling mills. It stands in the midst of charming scenery, and contains a large spring of the purest water, from which it derives its name.



BELL-BIRD.

**BELLEGARDE**, a hill fortress of France. Situated on the Spanish confines, on the road from Perpignan to Figueras, and in the pass between Col-de-Portus on the east and Col-de-Panizas on the west; it has belonged alternately to each nation. Here the French under Philip III were defeated by Peter III of Arragon in 1285. In the fourteenth century it consisted only of a fortified tower, captured by the Spaniards in 1674, and again by the French in 1675. In 1793 it was blockaded and taken by the Spaniards, but was retaken by the French in the following year.

**BELLE ISLE**, an island in the Atlantic, about midway between Newfoundland and Labrador, is chiefly known as giving name to the adjacent strait on the southwest, which forms the most northerly of the three channels between the Gulf of St. Lawrence and the open ocean.

**BELLISLE**, CHARLES LOUIS AUGUSTE FOUQUET, DUC DE, marshal of France, born at Villefranche, in Aveyron, Sept. 22, 1684, died Jan. 26, 1761. He early distinguished himself in the wars in Italy and the Low Countries against Spain, and afterwards in Poland. In the war of the Austrian succession he stormed Prague in 1741 and in the following year conducted the marvelously skillful retreat to Eger. In 1757 he was made war minister, and as such introduced important improvements in the French service. See *Britannica*, Vol. IX, p. 586.

**BELLEVUE**, a mining town of Idaho, situated in the northern part of Alturas county, between the Wood and Little Wood Rivers. It is the business center of an important mining region, and of the farming and stock-raising industries of the vicinity.

**BELLE PLAINE**, a village of Iowa, about thirty-five miles west of Cedar Rapids, and two miles north of the Iowa River. It contains railroad machine-shops, manufactories of flour and gloves, and is an important center of transportation for grain.

**BELLEROPHON**, a genus of extinct gasteropodous mollusks, represented by a great number of species occurring in the Silurian, Devonian and Carboniferous rocks in many parts of the world.

**BELLES-LETTRES**, a term adopted from the French, and generally used in a vague way to designate the more refined department of literature, but has in fact no precise limits. In English usage it is synonymous with another vague expression, *polite literature*, including history, poetry, and the drama, fiction, essay and criticism.

**BELLEVILLE**, a town of France, in the department of the Seine, forming a suburb of Paris, and inclosed by the new fortifications. It has manufactories of cashmeres, varnished leather, articles of polished steel, chemical stuffs, etc. There are springs at Belleville which have supplied Paris with water from a very early date, and it has tea-gardens and other places of amusement much resorted to by the Parisians. It has been a center of communistic agitation. Population, 75,000.

**BELLEVILLE**, a prosperous city of Illinois, and capital of St. Clair county, built on elevated ground; is on the St. Louis and Southeastern, the St. Louis, the Belleville and Southern and the Illinois and St. Louis Railroads. The distance from St. Louis is fifteen miles, from Springfield, the State capital, 110 miles. A branch road also runs to O'Fallon in the same county. Here are eight or ten churches, a convent, good schools, one national bank and one savings bank, two daily German papers and two weekly English papers. Here are several breweries, and large manufactories of various kinds, such as of iron, nails, flour, thrashing machines, steam engines, pumps, drills, etc. Here also are valuable

and easily-worked mines of bituminous coal. Population in 1880 was 10,663; in 1890, 15,360.

**BELLEVILLE**, a city of Kansas, county-seat of Republic county, is the center of a rich agricultural and mining district, and the seat of a college.

**BELLEVILLE**, a thriving town in the province of Ontario, Canada, situated on the Bay of Quinte, Lake Ontario, forty-eight miles west of Kingston by rail. It is the seat of Albert University, founded in 1857. Population, 9,516.

**BELLEVUE**, a beautiful town of Iowa, located on a high bank of the Mississippi, about twenty-five miles below Dubuque. It is a fashionable summer resort, and an important center of transportation, by rail and water, for grain, stock and produce.

**BELLEVUE**, a manufacturing town of Michigan, about twelve miles northeast of Battle Creek. It contains important manufactories of lumber, flour and iron, and produces excellent lime.

**BELLEVUE**, a village of Nebraska, county-seat of Sarpy county, on the Missouri, fifteen miles below Omaha. It contains an excellent high school and a manufactory of bee-hives.

**BELLEVUE**, a manufacturing town of Ohio, forty-five miles southeast of Toledo. It contains a number of foundries and machine-shops, and manufactories of carriages, plows and barrels, and is an important grain market.

**BELLINGHAM BAY**, a village of Washington, on the bay of the Pacific of the same name. It produces large quantities of lignitic bituminous coal, considered the best on the Pacific coast.

**BELLINGHAM**, RICHARD, born in England, 1592, died, Dec. 7, 1672. He came to Boston in 1634, was one of the original patentees of the colony, and after being deputy-governor, in 1641 was elected governor, again in 1654, and from 1665 up to his death he held that office; being deputy-governor thirteen years and governor ten years. In 1664 he was chosen major-general. Bellingham was an obstinate man, but one who commanded respect. He was intolerant with regard to religious sects which differed from his own.

**BELL METAL**, a sonorous alloy used in making bells. The principal ingredient is copper; the alloy, being generally twenty to twenty-five per cent. of tin, zinc or other metal, is sometimes used, however, with the copper.

**BELLOMONT**, or **BELLAMONT**, RICHARD COOTE, earl of, the eldest son of Baron Coote of the Irish peerage, born in 1636, died at New York, March 5, 1701, and was buried at the Battery. He now lies in St. Paul's churchyard on Broadway. In England the subject of this sketch held several prominent offices. He was member of Parliament in 1688, and treasurer and receiver general, several years later, to Queen Mary. Being appointed governor of New York and Massachusetts in 1795, he started for the former place, and during his stay became extremely unpopular. He went to Massachusetts in 1699, where he was received cordially. The king had sent him out with the primary object of suppressing piracy, and the governor, with the king's consent, equipped a ship of his own and sent Captain William Kidd to clear the surrounding waters of pirates. Kidd turned pirate, and the governor was even suspected of complicity. Bello-mont evinced his honesty by going to New York and waging a ruthless war on illegal traders. This made him unpopular, and petitions were sent to England for his recall. These troubles hastened his death.

**BELLOT STRAIT** is the passage connecting Prince Regent Inlet with Peel Strait or Sound, and separating North Somerset from Boothia Felix. Kennedy, in his search for Franklin, discovered its



eastern entrance, and named the strait after his lamented companion, Bellet. See Britannica, Vol. III, p. 549. After four fruitless attempts to explore it, the achievement was accomplished by McClintock; it is about 20 miles long, and at its narrowest part about one mile wide, running between granite shores rising from 1,500 to 1,600 feet. The winds and the waters have full sway here, the water flowing from the west in permanent currents and flood tides.

**BELLOWS FALLS**, a manufacturing village in Windham county, Vermont. It is situated on the Connecticut river, which here has a fall of forty-four feet in half a mile and furnishes water power for the manufacture of paper, farming-implements, and woolen goods.

**BELLOWS FISH**, a local name for several species of fishes; particularly in Rhode Island, or the angler-fish; and, in Europe, for the trumpet-fish of the Mediterranean and Atlantic coasts.



TRUMPET-FISH.

**BELLOWS, HENRY WHITNEY**, an eminent Unitarian clergyman, born at Boston, Mass., June 11, 1814, died in New York

city, Jan. 30, 1882. He graduated at Harvard and afterwards at the Cambridge divinity school. He was ordained pastor at the Congregational Church in New York, and here he remained for forty-three years. He was editorially connected with the "Christian Inquirer," "Christian Examiner" and the "Liberal Christian." Several notable addresses were made by him on public occasions. He was president of the U. S. Sanitary Commission, holding office from 1861 to 1878—during which time \$15,000,000 in supplies and \$5,000,000 in money were distributed according to his directions.

**BELLOY, PIERRE LAURENT BUIRETTE**, born in Saint-Flour, Auvergne, in 1727, died in 1775. He was one of the first French dramatists who ventured to introduce on the stage native instead of Greek or Roman heroes.

**BELL ROCK**, or **INCHCAPE**, an old red sandstone reef in the German Ocean, twelve miles southeast of Arbroath, and almost opposite the mouth of the Tay. It is 2,000 feet long, and at spring-tides part of it is uncovered to the height of four feet, the sea being only three fathoms deep for one hundred yards around. It caused at one time a great deal of shipwreck, and tradition states that the abbot of Aberbrothwick (Arbroath) placed a bell on it, "fixed upon a tree or timber, which rang continually, giving notice to the sailors of the danger."

**BELLS**. For general article on BELLS, see Britannica, Vol. II., pp. 526-39. American bells are now found in all quarters of the globe. The special aim of bell-founders in the United States is to produce the greatest volume and prolongation of tone, combined with the best quality of sound and the highest traveling character from the least weight of metal, and these results have attained to such an extent as to secure to the trade a greatly extended and rapidly increasing patronage. American manufacturers may be congratulated upon the generally acknowledged fact that their bells are uniformly designed and cast with superior excellence in all these respects. As the musical qualities, purity and beauty of tone and power, that distinguish the best bells from those of an inferior class depend largely on the purity of the material used, the greatest care is taken as to the selections made. The following is quoted from the circular sent out in 1891 by one of the oldest and leading American firms:\*

"1. We guarantee that all the copper melted and used in the manufacture of the bell or bells will be the purest new ingot copper that can be obtained, said copper being guaranteed to us to be the purest manufactured.

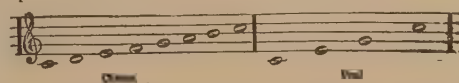
"2. We guarantee that, with each *seventy-seven pounds* of said copper, we will melt and mix not less than *twenty-three pounds* of best new imported block tin.

"3. We guarantee that an analysis of the bell or bells will show that the bell metal is composed of the best of copper and tin only, and that it is not in any manner debased by the addition of any cheap metal or metals.

"4. We further guarantee that no cheap, impure or brittle ingot copper, and that no old copper, with its accumulations of solder and dirt, will be used in the manufacture of the bell or bells."

"Sets of bells, of all kinds, in foreign countries are usually called *peals*; in America the term is applied to those which are attuned to harmonic intervals, while those which are attuned to diatonic intervals are called *chimes*. Thus, a set of bells upon the

eight notes of the music scale is a *chime*; a set upon the first, third, fifth and eighth is a *peal*:



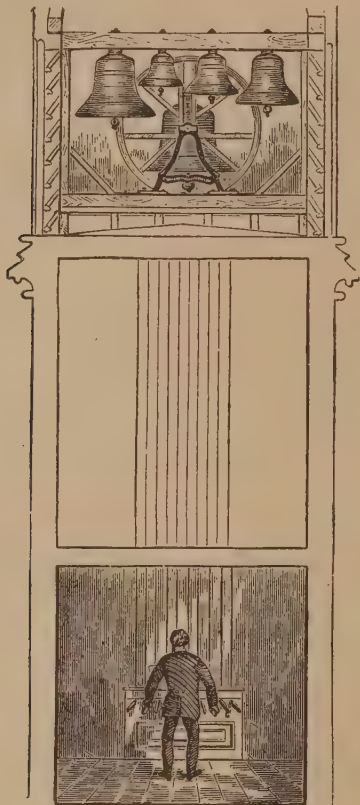
"The smallest number of bells that may be said to compose a chime is five, while what might be called the natural number—corresponding to the notes of the natural scale—is eight; but as the addition of an extra bell giving the note of the flat seventh creates a new series of diatonic tones in the key of the fourth, thus allowing music of two different keys to be played, this bell is usually added to the octave, so that a full chime is now understood to consist of at least *nine* bells, which number may, of course, be increased by adding bells which produce other tones, either within or beyond the octave.

"The best manner of mounting chimes is to provide the largest bell of the set with the usual fixtures, so that it may be rung as an ordinary church-bell, and to suspend the others stationarily from trusses in such positions as the capacity of the tower may require; the general plan of mounting, as also the arrangement of the chiming apparatus, being shown in the illustration. Should the bell room be limited in width, but have a fair height, the bells are placed in sections above each other, the position being a matter of indifference, provided the windows are of sufficient height to give egress to the sound.

"Chime-ringing levers enable the ringer to perform any music within the range of the bells the same as upon a musical instrument, the elasticity of touch and effect of the blow being greatly enhanced by our recently improved mode of connecting the levers with the clapper, by means of which the same facility of execution is secured as upon the pedals of an organ. It should be stated, both for the information of purchasers and in commendation of this mode of chime-ringing, that it does

\*That of Meneely & Co., West Troy, N. Y., to whom we are indebted for special favors in the preparation of this article.

not require the services of a professional musician, but may be performed acceptably, and with comparatively little practice, by almost any person having an ear for music."



As it is impracticable to play tunes upon peals (as distinguished from chimes), they are usually so mounted that each bell may be swung, thus allowing different bells to be rung for different church services, if desired, while their being rung together, either successively or simultaneously, produces a pleasing effect. A peal being usually considered as the nucleus of the future chime, the careful manufacturer bears this in mind in determining the weights and tones of the bells selected for peals, and retains a record of the key of the tenor bell as a needed help in selecting additional bells to complete the possible future chime.

As to the inquiry often made, how far a bell of given weight may be heard, it is impossible to give any satisfactory information. At least one-half depends upon the formation of the land surrounding the structure in which the bell is hung. Lengthwise of a valley the sound will often go more than twice as far as it does over an adjoining hill. So also it may be heard much farther over water than over a plain. So also the more open the space in which the bell is hung the freer will the sound be to reach long distances. In all cases the usual acoustic laws govern the "reaches" of the "ringing-bell." A small bell outside, or in a partially con-

fined room in a tower, may be heard twice or even several times as far as one shut in by obstructions of walls or partially open window-blinds. Referring to this question, a well-informed and well-known critic on towers says:

"Nine out of ten modern towers are built as if the architect supposed it was the bell founder's business not only to cast the bells but hang them, make the towers large enough to hold them, and to invent some way or other of making the sound find its way out of the windows wherever they are and however small they may be. Oddly enough, too, almost as I am writing this, I have received a letter from a London bell-ringer of twenty-six years' standing, complaining that, of all the churches built there within the last thirty years, there are only two which are properly adapted to the bells which they contain; the main faults being that the bell chambers are too low, and the windows so small that not half the sound of the bells can get out. In a tower which is nothing more than a base for a spire the bells have to hang so low that they are hardly above the roofs of the surrounding houses, and so are disagreeably noisy at a little distance and yet hardly to be heard a great way off, whereas, good bells properly placed always sound the best at a distance; and when they are clear of all these defects in the tower the architect or builder generally contrives to bottle up the sound as much as possible by filling the bell chamber windows with close louvers deeply overlapping each other, so that even the sound that does get out is, as it were, shot down onto the roof of the church instead of being allowed to spread freely. Mr. Ruskin also abuses close louvers on architectural grounds, and notices the grand effect of the large, wide ones in many foreign churches."

The largest bell made in the United States weighed 22,000 lbs., and before it was fractured hung in the City Hall, New York. On some occasions it was heard thirteen miles up the Hudson River; but that date was before the upper part of Manhattan Island was covered with structures varying from four to twenty stories in height. The largest bell in Canada is that of Notre Dame Cathedral, Montreal, weighing 29,400 lbs. The reference catalogues of American dealers would present extended lists showing a great number of large bells throughout the country ranging in weight from 8,000 lbs. to 17,000 lbs. As a list of the largest bells of the Old World is given in detail in Vol. III, it is omitted in these Additions and Revisions; but the reader will be gratified to find here



THE GREAT BELL OF MOSCOW.

a correct illustration of the bell of Moscow, the greatest ever constructed, whose weight was such that it was never hung.



The bell bears an inscription stating that the first great bell was cast in 1553, and weighed 36,000 pounds; during the reign of the Tsar Alexis it was ruined by fire, and in 1654, with additional metal, was recast into the second great bell, the weight of which was 288,000 pounds; that this second bell was in 1706 also destroyed by fire, and in 1733, with still more metal, was recast by order of the Empress Anne, into the present great bell, which measures 22 feet, 8 inches across the mouth, 19 feet, 3 inches in height, and weighs (estimated) about 440,000 pounds.\* It seems to have been cracked in cooling; a nearly triangular-shaped piece of about 6 feet in height and 7 feet at the base, and weighing about 11 tons, was broken out at the rim and now stands on the ground just below the opening thus formed. When the great bell was placed in its present position it was intended for service as a chapel, and for that purpose an opening was left through the pedestal wall which, with the opening in the bell above it, forms an imposing entrance.

To the list in *Britannica*, Vol. III, page 539, should be added the new bell of St. Paul's in London, commonly known as the "Great Paul." It was raised to its place May 31, 1882, and dedicated with imposing ceremonies three days later. It is 8 feet 10 inches in height, and 9 feet 6 $\frac{3}{4}$  inches in diameter, and weighs 17 $\frac{1}{2}$  tons. Its note is E flat; materials, copper and tin; and its cost about \$15,000.

BELLS, on shipboard, is a term having a peculiar meaning nearly equivalent to that of "time" or "o'clock" in ordinary land life. The time is divided into watches of four hours each, ending at 4, at 8 and at 12, and the stroke of a bell marks each half-hour. These strokes have no reference to the hour, but simply designate the number of half-hours that have passed in that particular watch. Thus, "three bells" is a phrase denoting that three half-hours have elapsed, but it does not in itself show to what watch it refers.

BELLUNO, a city of Venetia, Northern Italy, on the right bank of the Piave, and 51 miles north of the city of Venice. It is walled, is the seat of a bishop, has a handsome cathedral, hospital, public library, fine aqueduct, etc. It has a trade in timber, and manufactories of silks, hats, leather and earthenware. Population, 10,000.

BELMONT, a village of Missouri, on the Mississippi River, opposite Columbus, Ky., noted as the site of a severe battle fought Nov. 7, 1861, in which the Confederate works were stormed and taken by the Federal troops under General Grant, and retaken by the Confederate forces under Major-General Polk.

BELMONT, a village of New York, situated on the Genesee River, about midway between Dunkirk and Elmira. It is extensively engaged in the manufacture of barrels.

BELMONT, August, financier, born at Alzey, Germany, in 1816, died in New York city, Nov. 24, 1890. He was educated in Frankfurt, entered the employ of the Rothschilds in 1830, and came to New York in 1837, where he settled as their agent. He soon began to prosper and at the age of forty was a millionaire. His office was on Wall street, but he was a banker, never a gambler in stocks. In 1844 Mr. Belmont was appointed consul-general by the Austrian government, and this office he held six years. He was a Democrat, was sent by President

Pierce as minister to the Hague, and from 1860 to 1872 was chairman of the national Democratic convention. He was of the opinion that the Southern States should be allowed to secede, thinking they would soon be glad to come back into the Union. The event of war proved Mr. Belmont in error, and caused him to change his views and advocate the prosecution of the war. He had such an influence abroad that he prevented the confederacy from obtaining credit in the foreign money market. While visiting Europe he was able to help the Union cause and furnished valuable information to Secretary Seward. Mr. Belmont was a lover of art, and made quite a collection of paintings. For years he was noted as a breeder of fine horses.

BELOIT, Kansas, a city and important business center, the county-seat of Mitchell county. The Solomon River furnishes excellent water power. White magnesian limestone, a good building stone, is here quarried.

BELOIT, a city of Wisconsin, situated on both sides of Rock River, immediately north of the boundary line of Illinois. It is the seat of Beloit College, the center of an extensive farming and dairying district, and the headquarters of important manufactures, including paper, reaping and mowing machines, water-wheels, plows and machinery.

BELOMANCY, a mode of divination by arrows, practiced among the Arabs and other nations of the East. A number of arrows being shot off with sentences written on labels attached to them, an indication of futurity is sought from the inscription on the first arrow found. This is only one of many ways of divining by arrows.

BELON, PIERRE (1517-64), a celebrated French naturalist, born in 1517, at Soullière. He studied medicine at Paris, and traveled through Germany. Afterwards he visited Greece, Asia Minor, Egypt and Arabia. He returned in 1549 and published the results of his travels in a work entitled, *Observations on Several Singular and Memorable Things Discovered in Greece, Asia, Judea, Egypt, Arabia and Other Foreign Countries*. Charles IX gave him apartments in the Château of Madrid, a sumptuous edifice in the Bois de Boulogne, constructed by Francis I. Here he resided till his tragic death in 1564; he was killed by robbers while gathering herbs in the Bois de Boulogne. In 1551 he published, among other things, an exact description of the dolphin, and the earliest picture of a hippopotamus. He published the most important treatise on ornithology of the 16th century.

BELPER, an English market town, in Derby county, on the Derwent. It contains the remains of the mansion which was at one time the dwelling place of John of Gaunt.

BELTON, the county-seat of Bell county, Texas, on Leon River. It has a Masonic institute, the Chamberlain Institute, and Baylor Female College, the oldest in the State. Its educational institutions are excellent and numerous.

BELUGRA, or WHITE WHALE (*Delphinapterus leucas*), a cetacean mammal allied to the dolphins. Its form, which is remarkably characterized by the softness of all its curves, adapts it for rapid and graceful movements. See *Britannica*, Vol. XV, p. 398; Vol. XXIV, p. 525.

BELUR, a village of Mysore, situated 130 miles west of Bangalore. It is known in the Puranas as *Velapura*, and locally regarded as the Southern Benares. It is the site of a celebrated temple. Population, 3,000.

BELVEDERE, originally an erection or the top of a house for the purpose of looking out on the surrounding country and enjoying the air, in which

\*This weight is just double that of the largest bell now in use in the world: viz, that suspended above the chapel of St. Nicholas, in the kremlin in Moscow, weighing 220,000 pounds. This was cast in 1827. It is said that the sound, when the bell is rung, which is only once a year, is "a deep, hollow murmur, vibrating all over Moscow like the rolling of distant thunder."

sense it is still understood in Italy. A part of the Vatican in Rome is known as the Belvedere, and gives name to the famous statue of Apollo. In France the word has come to signify any kind of summer-house or place of refreshment.

BELVEDERE, an annual plant of the natural order *Chenopodiaceæ*, a native of the Middle and South of Europe and of Asia, familiar in gardens as an ornamental annual, not on account of its flowers, which have no beauty, but of its close, pyramidal, rigid form, and numerous narrow leaves, which make it appear like a miniature cypress tree. It is sometimes called Summer Cypress.

BELVIDERE, an educational and manufacturing town of Illinois, on the Kishwaukee River and Chicago and Northwestern Railroad; it is the county-seat of Boone county.

BELVIDERE, the capital of Warren county, N. J., a flourishing town on the Delaware River and Pequest Creek. There is a bridge here across the Delaware. Abundant water power is furnished for cotton and flour mills and a carriage factory. The Pennsylvania Railroad passes through the town. The surrounding region furnishes iron ore, limestone, slate and magnesia.

BELVISIA (also called *Napolona*), a genus of exogenous plants, the type of the order *Belvisiaceæ*, of which order only a few species, natives of tropical Africa, have yet been discovered. They are large shrubs, with smooth, simple, leathery leaves, the beautiful and very curious flowers, growing in threes, being sessile in the axils of the leaves. The calyx is a thick leathery cup, divided into five ovate segments. The corolla is composed of three distinct rings, the outer one five-lobed, and furnished with ribs, by means of which it is strongly plaited, turning back and hiding the calyx when full blown; the second, a narrow membrane, divided into numerous regular segments like a fringe; the third, an erect cup-shaped membrane. The erect stamens resemble another cup. The ovary is five-celled, each cell containing two ovules; the short, thick style is five-angled, with a broad, flat stigma of as many angles. The fruit is a soft berry, crowned with the calyx, with large kidney-shaped seeds.

BEM, JOSEPH (1795-1850), commander of the army in Transylvania during the Hungarian revolution, born at Tarnov, in Galicia, in 1795. After a course of military adventure in Poland he went to France, where he resided for a considerable time. In 1848 he joined the Hungarians and was intrusted with the command of the army of Transylvania. He defeated the Austrian army and succeeded in driving their allies, the Russians, back to Wallachia. Having thus made himself master of Transylvania, at Kossuth's request he hastened into Hungary, where he took part in the unfortunate battle near Temesvar. He made his escape into Turkey, where he embraced, from political motives, the profession of Islam; he was raised to the dignity of a pasha and obtained a command in the Turkish army. In 1850 he was sent to Aleppo, where, after suppressing the sanguinary insurrection of the Arabs against the Christian population, he died of fever, Dec. 10, 1850. He was in private life characterized by his benevolent disposition, and as a military leader distinguished by courage, presence of mind in extreme danger, and remarkable rapidity of movement.

BEMBATOOKA, BAY OF, a safe and commodious bay on the northwest coast of Madagascar. Prime bullocks are sold here, and bought extensively by agents of the French government, who have them driven to Fort Dauphin on Antongil Bay, on the opposite side of the island, where they are killed and cured for the use of the French navy, and for

colonial consumption. Rice is also sold very cheap at Bembatooka. Majunga, on the north side of the bay, is an important town, Bembatooka being only a village.

BEMBECIDÆ, a family of hymenopterous insects of the division in which the females are furnished with stings. Along with *Sphegidæ*, and other nearly allied families, they receive the popular name of sand-wasp. They very much resemble bees or wasps in general appearance; they are natives of the warmer parts of the world. Some of them are remarkable for the odor of roses which they emit. The females make burrows in sandy banks, in each of which they deposit an egg, and along with it bodies of flies as food for the larva.

BEMBRIDGE BEDS, a division of the Upper Eocene strata, resting on the St. Helen's and capped by the Hempstead series, the maximum thickness being 115 feet. Here have been found remains of the *Anoplotherium*.

BEMIS HEIGHTS, or BEMUS HEIGHTS, a small village of New York, in Saratoga county, famous for having been the place where occurred the first battle of Stillwater, Sept. 13, 1777. Generals Gates and Burgoyne were the opposing commanders.

BEN, a Hebrew word signifying "son," and forming the first syllable of many names, ancient and modern, as Benhadad, Ben'amin, &c. The corresponding Arabic word *Ibn*, or *Ebn*, in like manner enters into composition of a great number of names, as Ibn Sina, Ibn-al-Faradi, etc. Ibn in some of its constructive forms, drops the initial vowel, thus nearly corresponding to the Hebrew, as *Jusuf-ben-Yakub* (Joseph, the son of Jacob).

BEN, a term of Gaelic origin, prefixed to the names of the principal mountains of Scotland, as Ben Ledi, Ben Lomond, etc. It is essentially the same as the Welsh *Pen*, the primary signification of which is "head," and hence it may be considered as equivalent to "mountain head." The term *Pennine*, applied to a division of the Alps, is doubtless derived from the Celtic *Pen* or *Ben*, and even the name Apennines is in all probability from the same root.

BEN, OIL OF, a fluid fixed oil, obtained from the seeds of a tree found in India and Arabia, and known as the horse-radish tree. The seeds are called Ben-nuts, and are roundish, with three membranous wings. The oil is used by watch-makers, because it does not readily freeze; also by perfumers, as the basis of various scents, and other oils are often adulterated with it.

BENATEK, a small town of Bohemia, on the right bank of the Iser, a few miles distant from Prague. It is worthy of note as being for a time the residence of the celebrated astronomer, Tycho Brahe.

BENBECULA, one of the Hebrides or Western Isles of Scotland, between North and South Nith, 20 miles west of Skye, and belonging to Caithness. It is eight miles long, and eight miles broad, low and flat, and consists chiefly of bog, sand and lake, resting on a substratum of gneiss rock, with a very broken coast-line. Population, 1,700, consisting of fishermen and farmers, who fertilize the soil with the seaweed which is cast ashore on the island.

BENCH-WARRANT, a process issued by a judge or court against a person guilty of some contempt, or indicted for some crime.

BEND, the name for one among the many kinds of knot by which ropes are fastened on shipboard. Seamen imply this meaning when they speak of "bending the cable," the "fishermen's bend," the "sheet bend," etc.

BENDA, GEORGE, the most distinguished of a notable musical family, born at Jungbunzlau, in



Bohemia, in 1721, died at Kostritz in 1795. He excelled as a pianist, violinist, and composer, and was bandmaster to the Duke of Gotha (1748-87), and in this period produced several operas and cantatas, such as *Ariadne auf Naxos* and *Medea*.

BENDEMANN, EDWARD, a celebrated painter of the Düsseldorf school, born at Berlin in 1811. He received a careful scientific education, but devoted himself to art, became a pupil of Schadow's and soon proved that he was not mistaken in his vocation. When he was but 20 years of age, his picture of the *Captive Jews* was exhibited at Berlin, and at once acknowledged to be a masterpiece. His next important work in 1833 represented *Two Girls at a Fountain*, followed in 1837 by *Jeremiah at the Ruins of Jerusalem*, a picture for which he obtained a prize-medal at Paris. His pictures are distinguished by a grace and charm arising from symmetry in drawing and composition, *naïveté* in conception, and a tender, harmonious, yet always truthful coloring. He was director of Düsseldorf Academy from 1859 to 1867.

BENDIGO, one of the most productive gold-fields in the colony of Victoria. It is about 25 miles to the north of Mount Alexander, which again is about 75 miles inland from Melbourne.

BENE, a town in the province of Mondovì, Piedmont, 18 miles from Coni. It occupies the site of the ancient *Augusta Bagiennorum* destroyed by Alaric. Many interesting vestiges are found in the neighborhood, and the ruins of an aqueduct, baths, and amphitheater are still visible. Population, 6,000.

BENEDEK, LUDWIG VON, an Austrian general, born at Odenburg, Hungary, in 1804, died at Gratz in 1881. He received a military education, entered the army as ensign in 1822, and became distinguished for gallantry and skill. He was governor of Hungary in 1860, and in 1866 was made commander-in-chief of the Austrian army. After the defeat at Sadowa he was brought before a court-martial, and although the proceedings were quashed by the emperor, Benedek never recovered from the savage criticisms of his mortified and defeated countrymen. See *Britannica*, Vol. III, p. 140.

BENEDETTI, VINCENT, a French diplomatist who held various important positions. When ambassador to Prussia, he urged offensively upon the king, in the public walks at Ems, in 1870, a measure distasteful to his majesty, through which he was denied all further interviews. Each government then claimed that it had been grievously insulted by the other, and when Benedetti returned to Paris, France declared war upon Prussia with a disastrous result to herself. See *Britannica*, Vol. IX, p. 626.

BENEDICTE, a hymn or song of the three children in the fiery furnace, sung in the Christian Church as early as the time of St. Chrysostom, and used in the Anglican Church in the morning service when the *Te Deum* is not sung.

BENEDICT, SIR JULIUS, born in Germany 1804, died in 1885. He was a musician and composer. In 1836 he took up his residence in England. He was musical director of the Kärntner Thor Theater, Vienna, in 1824; and, later on, occupied the same position at Naples. In Paris, and afterward in London, in 1835, he appeared with great success as a pianist. In 1850 he conducted at Jenny Lind's concerts in America.

BENEDICT, BISHOP, an ecclesiastic, born in England in 629. His influence upon Anglo-Saxon civilization and learning was most important. Until about the year 654 he served at the court of Oswin, king of Northumberland, after which he spent about ten years at Rome in study. In 665 he

returned to Rome on a mission for Alchfrid, king of Northumbria, and was made abbot of the monastery of St. Peter, at Canterbury, after his return to England (668). He purchased a valuable collection of books about five years later, and went to Northumbria, where he founded the famous monastery of Wearmouth on a piece of land near the mouth of the Wear, presented to him by King Egfrid. See *Britannica*, Vol. III, p. 481.

BENEDICTINES. See *Britannica*, Vol. III, p. 558, and Vol. XVI, pp. 704, *et seq.* An account of the Benedictines, as affecting the history of England, is given in Vol. VIII, pp. 372, *et seq.* Their historical monasteries are described in the article *ABBAY*, and their libraries in Vol. XIV, p. 513. The Benedictines in the United States are known as the American Cassinian Congregation. The parent organization is the house at La Roche, Pa., founded in 1846 as the Monastery of St. Vincent, and raised in 1855 to the dignity of Abbey of Saint Vincent. It is under the jurisdiction of a mitred abbot, appointed by the Pope, and under the same general supervision is a large and increasing number of monasteries. The abbey at Saint Meinard, Ind., which was founded in 1853, is a filiation of the celebrated Benedictine Abbey of Einsiedeln, in Switzerland. The first convent of Benedictine nuns in the United States was established at Saint Mary's, Pa., in 1853.

BENEDICTION (Lat., *benedicere*, to speak well), a solemn invocation of the Divine blessing upon men or things. The simplest form of this ceremony may be considered as almost coeval with the earliest expression of religious feeling. The Jewish patriarchs before they died invoked the blessing of God upon their children, and later on the priests were commanded to solicit Divine blessing upon the people. The custom, being sanctioned by Christ, was carried forward into the Primitive Church, where it gradually developed in different forms. In the Eastern as well as the Western Church it is regarded as an essential preliminary to almost all important acts.

BENEDICTUS, the so-called "cantic of Zachary" (Luke i, 68-79), which forms part of the office of the lands in the Roman breviary. It has been set to music by all the most eminent composers.

BENEDIX, JULIUS RODERICK, German actor, manager, and play-writer, born at Leipsig in 1811, died there Sept. 26, 1873. Of his numerous pieces the best are his comedies, most of which are popular in Germany. His dramatic works fill 27 volumes.

BENEFICIARY, a term in law sometimes applied to the holder of a benefice. It may also denote a person who is in the enjoyment of any interest or estate held in trust by others.

BENEFIT OF CLERGY. See *Britannica*, Vol. V, pp. 827-28, and Vol. VIII, p. 372. The *Privilegium Clericale* was abolished in England by the act of June 21, 1827, and in Ireland by that of July 15, 1828. All doubt as to the liability of peers to punishment for felony was removed by Parliament in 1841. In the United States this anomalous privilege has been made the subject of aversive legislation by many of the individual States, some denying that the right ever legally existed in this country, others recognizing it as a part of the common law, follow in effect the federal act of April 30, 1790, which denies benefit of clergy to any one convicted of a capital offense.

BENEFIT OF INVENTORY, in Scottish law, a legal privilege, whereby an heir secured himself against unlimited liability for his ancestor by giving up, within the *annus deliberandi*, an inventory of his heritage or real estate, to the extent of which, and no farther, was the heir liable

**BENEVOLENCE**, a name applied to a forced loan or contribution, levied by kings of England without legal authority. It was first so called, in 1473, when asked from his subjects by Edward IV, as a mark of good-will towards his rule; but similar compulsory "free-will offerings" had not been uncommon in former reigns. Under Richard III, in 1484, an act of Parliament abolished benevolences as "new and unlawful inventions," but, spite of this, they continued to be exacted by Richard himself and by Henry VII. In 1614 James I tried, but with little success, to raise money by this expedient, and it was never again attempted by the crown, Charles I expressly declining to have recourse to it. See *Britannica*, Vol. IX, p. 177.

**BENEZET**, ANTHONY, born at St. Quentin, France, Jan. 31, 1713, died at Philadelphia, Pa., May 3, 1784. He was a philanthropist, and devoted his attention to the abolition of the slave trade, to the education of the colored race and the alleviation of the condition of prisoners. He published a few works which are of a religious or historical nature.

**BENFEY**, THEODOR, the greatest orientalist and comparative philologist of modern times, born of Jewish parents, near Gottingen, January, 1809, died in 1881. He studied in Gottingen, Munich, Frankfurt, and Heidelberg, and in 1830 turned his attention to the study of Sanskrit. For an extended account of his career, see *Britannica*, Vol. XVIII, p. 781.

**BENGAL**, BAY OF, a portion of the Indian Ocean, into which flow the Ganges and the Brahmaputra on the north, the Irrawaddy on the east, and the Mahanuddy, the Godavary, the Kistna or Krishna, and the Caverry on the west. The northern shore, measuring 250 miles, reaches from Balasore to Chittagong, and at the south the bay extends for 1,200 miles between Coromandel and Malacca.

**BENGAL LIGHT**, or BLUE LIGHT, a brilliant light used at sea for signaling, and in ordinary pyrotechny. It is prepared from nitre, sulphur and the tersulphuret of antimony, mixed in the following proportions by weight: Nitre 6, sulphur 2, tersulphuret of antimony 1. When ignited it bursts into rapid and vivid combustion, evolving a brilliant, penetrating, but mellow light. As the fumes evolved are poisonous, the light cannot be used in safety in inclosed spaces.

**BENI**, the name of a large river and also of a department of Bolivia. Chief towns of the province are Trinidad and Loreto.

**BENICIA**, a commercial and manufacturing city of California, and its former capital, is situated on the north side of Carquinez Strait, at the head of navigation for large sea-going vessels, about midway in a direct line between San Francisco and Sacramento. One of the principal objects of interest is the old capitol, a fine brick edifice overlooking the water-front from a commanding eminence. Benicia barracks and the United States arsenal for the Pacific coast are located here. Among the principal manufactories are flour, leather, and hydraulic cement;—large quantities of superior limestone being quarried in the vicinity. Benicia is the seat of St. Augustine College, and of a law school, a number of young ladies' seminaries, and a Dominican monastery.

**BENI-HASSAN**, a village of Upper Egypt, on the east bank of the Nile. The place is remarkable for the numerous grottoes in its vicinity, which are among the most interesting in Egypt. These catacombs, which are excavated in the calcareous bank, are about thirty in number, and are supposed to have been used as sepulchres by the principal inhabitants of Hermopolis, a city that stood on the opposite side of the river. The paintings, though not

so artistic as those in the Theban catacombs, are of earlier date, and throw much curious light on the manners and customs of the ancient Egyptians.

**BENI-ISGUEN**, a large town in the interior of Algeria, surrounded by a rampart flanked with towers, and said to be nearly as populous as Algiers. It has some trade in grains.

**BENI-ISRAEL** (SONS OF ISRAEL), a remarkable race in the west of India, who preserve a tradition of Jewish descent, and have from time immemorial acknowledged the law of Moses, although in many respects conforming to the idolatry of the Hindus, by whom they are surrounded. Their features exhibit a resemblance to those of the Arabian Jews. Until recently they were ignorant of many of the books of the Old Testament, and it was not without hesitation that they consented to receive those of the later prophets. They are supposed to be a remnant of the ten tribes, and to have settled in India long before the Jews of Cochin. They object to the name of Jew, and deem its application to them a reproach.

**BENI-SOUFEF**, a town of Egypt, capital of the *moudirieh* or province of the same name, situated on the left bank of the Nile, about sixty-five miles above Cairo, with which it is connected by railroad. It is a pretty and well-built town; contains a number of cotton-mills and alabaster quarries, and is the entrepot for the produce of the rich valley of Fayoom.

**BENITIER**, or **BENATURA**, the name of the vase or vessel in which "holy water" is held in Roman Catholic churches. Benitiers were either movable or fixed. Portable ones, commonly of silver, were used in processions. The benitiers belonging to the church of St. Sulpice in Paris are remarkable for their great beauty. They are formed of magnificent shells and bordered with gilt copper.

**BENJAMIN**, JUDAH PHILIP, born at St. Croix, West Indies, Aug. 11, 1811, died at Paris, May 8, 1884. His parents were English Jews, and his boyhood was spent in Wilmington, North Carolina. He studied at Yale, but did not complete the course. After reading law in New Orleans he was admitted to the bar in 1834. He rose to prominence in the profession, was U. S. commissioner in 1847 appointed to investigate Spanish land-titles, was admitted to practice in the U. S. Supreme Court, was presidential elector at large in 1848 from Louisiana, and elected to the United States Senate in 1852. He belonged to the Democratic party, and when the Southern confederacy was formed he held successively the offices of attorney-general, secretary of the war department, and then secretary of state till the overthrow of the confederacy. Jefferson Davis placed great confidence in Mr. Benjamin's ability, and the latter was called "the brains of the confederacy." On the downfall of the confederacy Mr. Benjamin made his escape from Richmond and sailed for Liverpool. Although fifty-four years old he began the study of English law, and in a few years his practice was both extensive and lucrative.

**BENJAMIN**, PARK, born at Demarara, British Guiana, Aug. 13, 1809, died at New York city, Sept. 12, 1864. His father was a native of Connecticut, but carried on business in Demarara. The son was very lame, and at an early age was sent to New England for education and medical treatment. He studied at Harvard and Trinity, and then read law, but his inclinations were in favor of literature. He went to New York and was associate editor of the "American Monthly Magazine" and afterwards of the "New Yorker." He was on the staff of several other publications, most of which were unsuccessful. He was a contributor to various periodicals



and the author of the poems: *The Meditation of Nature; Poetry: a Satire; Infatuation; The Nautilus; To One Beloved; The Departed; and The Old Sexton.*

BEN-LAWERS, a mountain in Perthshire, Scotland, about 32 miles from Perth, on the west side of Loch Tay. This mountain is easy of ascent and rich in specimens of alpine plants. A magnificent view is commanded from its summit, which has an elevation of 3,945 feet. Ore of titanium is found in the mountain.

BEN-LEDI, a mountain of Perthshire, 4 miles from Callander, with an elevation of 2,863 feet. It received its name from the Druids, who are supposed to have had a place of worship on its summit. This mountain is celebrated in Scott's *Lady of the Lake*.

BEN-LOMOND, a lofty mountain the northwest of Stirlingshire, Scotland, on the east side of Loch Lomond. This mountain, forming the southern extremity of the Grampians or Central Scottish Highlands, is 3,192 feet high, and consists of mica and slate, with veins of quartz, greenstone, and feldspar porphyry. The summit is steep on the north, with a gentle declivity on the southeast. It is covered with vegetation to the top. Though considerably surpassed in height by several other Scottish mountains, none are more imposing. Seen from Loch Lomond, it appears a truncated cone, and between Stirling and Aberfoyle a regular pyramid. It has been ascended by a greater number of tourists than any other of the Highland mountains. The magnificent view from the top in clear weather includes the whole length of Loch Lomond, which is 30 miles. The north semicircle of the horizon is bounded by Bens Lawers, Voirlach, Ledi, Cruachan and Nevis, while some of the beautiful Perthshire lochs are seen.

BEN-MACDHUI, a mountain of Aberdeenshire, belonging to the Grampian range. It has an elevation of about 4,296 feet.

BENNET, JAMES GORDON, JR., born in New York city, May 10, 1841. He is the only son of the founder of the "Herald." He became proprietor of this paper on the death of his father. He is very fond of yachting, and has taken part in two famous races with English yachts. His *Henrietta* won in 1866, but his *Dauntless* was beaten in 1870 by the English *Cambria*. He has acquired fame and advanced the interests of his paper by publishing in England storm-warnings from the United States signal service, by fitting out the *Jeannette* for a polar expedition, and by sending Henry M. Stanley to search for Livingstone. Mr. Bennett resides most of the time in Paris, where he attends to the foreign news department of his paper. In 1883 he and John W. Mackay formed the Commercial Cable Company, and laid a new line between America and Europe.

BEN-NEVIS, a lofty mountain in the county of Inverness, Scotland. It has a height of 4,406 feet, is exceedingly difficult of ascent, with a precipice of 1,500 feet in depth on the northeast side, where snow remains throughout the year. Granite and gneiss form the base of the mountain, which, in its upper part, is composed of porphyry.

BENNINGSEN, LEVIN AUGUST THEOPHILUS, count (1745-1826), a distinguished Russian general, born at Brunswick in 1745. He joined the Russian army in 1773, and in the Turkish war soon attracted the notice of the Empress Catharine, who employed him to carry out her designs against Poland. He was one of the leaders of the conspiracy against the Emperor Paul. He fought with success in the battle of Pultusk in 1806, and held the chief command in the obstinate and murderous struggle at Eylau in 1807. When Napoleon invaded

Russia in 1812, Bennigsen commanded the Russian center on the bloody field of Borodino, and gave orders for fighting a second battle before the walls of Moscow. Before the French began their retreat, he gained a brilliant victory over Murat at Woronowa. In 1813 he fought victoriously in the battle of Leipsic, and was created count by the Emperor Alexander on the field. He retired to his estate in Hanover, where he died in 1826.

BENNINGTON, the largest manufacturing town of Vermont, in the southwestern part of the State, 36 miles from Troy, N. Y. It is the county-seat of the county of the same name. Noted for the battle of Bennington, Aug. 16, 1777, where General Stark, at the head of the "Green Mountain Boys," defeated a detachment of Burgoyne's army. Bennington, North Bennington and Bennington Center are the three villages of the town of Bennington. A soldiers' home and excellent schools are at Bennington. Some of the articles manufactured here are iron, woolen goods, pottery, chairs and lumber.

BENUÉ, an important river of Central Africa. It enters the Quorra or Niger from the east, about 230 miles above the mouth of the river in the Gulf of Guinea.

BEN-RHYDDING, a health resort in the West Riding of Yorkshire on the River Wharfe, 16 miles from Leeds.

BENSHEE, or BANSHEE, an imaginary being in the superstitions of the Irish—a female who is called the wife of the fairies, and who makes herself known by wailings and shrieks, premonitory to a death in the family over which she is presumed to exercise a kind of guardianship. A similar superstition prevailed, and is, perhaps, not yet extinct, in the Highlands of Scotland.

BENSON, EDWARD WHITE, an English divine, born at Birmingham in 1829. He became chancellor of Lincoln Cathedral in 1872; bishop of Truro in 1877; archbishop of Canterbury in 1883.

BENSON, EGBERT, jurist, born in New York city June 21, 1746, died in Jamaica, L. I., Aug. 24, 1833. He graduated at King's College; was first attorney-general of the State; was in the State legislature, and from 1784 to 1788 sat in Congress. He was judge of the Supreme Court, 1794-1802; was in Congress again from 1813-1815; was first president of the New York Historical Society, and enjoyed many other honors and offices.

BENSON, EUGENE, painter, born in Hyde Park, N. Y., in 1837. He studied art in New York, Paris, Venice and Rome, and traveled much in Europe and the East. In the list of his paintings are *Cloud Towers, Hay Boats, Bazaar at Cairo, Hashish Smokers, Fire-shippers, State Secret in Venice, Art and Love, and Ariadne*.

BENSON, JOSEPH, an English divine and author, best known for his highly esteemed *Commentary on the Holy Scriptures*, and his *Apology for the Methodists*. He died in 1821.

BENT GRASS (*Agrostis*), a genus containing about sixty species of grasses, widely distributed through temperate and cold climates. All are of slender and delicate appearance. Some are very useful as pasture-grasses and for hay, on account of their adaptation to certain kinds of soil. The common bent grass, *Agrostis vulgaris*, abounds in dry, elevated pastures. *A. canina* is also very common. *A. dispar*, the American herds-grass, is cultivated in France. Most of the European species are North American also.

BENTHAM, GEORGE, an English botanist, born in 1800 at Stoke, a village since absorbed in Portsmouth, died Sept. 10, 1884. The son of an officer who had risen to high rank in the Russian and the English service, young Bentham's earlier years

were spent largely abroad, but from 1826 to 1832 he lived in London with his uncle, the jurist, and studied law. In 1827 he published *Outlines of a New System of Logic*, in which is set forth for the first time the doctrine of the quantification of the predicate. He was called to the bar, but soon abandoned the law for botany. He catalogued the plants of the Pyrenees (1824-26), and was elected in 1828 a Fellow of the Linnean Society, and in 1829 secretary of the Horticultural Society. From this time he devoted himself entirely to his new study, and soon published his important *Labriatarum Genera et Species* (1832-36). In 1854 he presented his collections to the Royal Gardens at Kew, where he prosecuted his studies during the remainder of his life. *Genera Plantarum* (3 volumes, 1862-83), in the completion of which he was assisted by Sir Joseph Hooker, is exhaustive and valuable, and may be said to summarize our present knowledge of botany. He was president of the Linnean Society from 1863 to 1874, and was a member of many other British and foreign learned bodies.

**BENTHAMIA**, a genus of plants of the natural order *Cornaceae*, consisting of Asiatic trees or shrubs, of which the fruit is formed of many small drupes grown together. *B. frugifera*, a native of Nepal, is a small tree, with lanceolate leaves, and a reddish fruit, very much like a mulberry, only somewhat larger; it is quite pleasant to the taste. The flowers are fragrant.

**BENTON**, JAMES GILCHRIST, soldier and inventor, born at Lebanon, N. H., Sept. 19, 1820, died at Springfield, Mass., Aug. 23, 1881. He was a graduate of the military academy in 1842. He assisted in the preparation of the "System of Artillery for the Land Service," and the "Ordnance Manual" in 1847. He served the following year at Harper's Ferry armory, and afterwards in the San Antonio ordnance depot. From 1849 to 1861 he was assistant inspector of arsenals, engaged in making experiments which led to the adoption of Springfield rifles, and an instructor of ordnance and gunnery at the military academy. For most of the time during the civil war he was commander of the Washington arsenal. Twice he performed acts of great bravery in extinguishing fire which had begun to burn in the arsenal and in a magazine; for his hardihood he was made lieutenant-colonel and colonel. He invented several military appliances, but never took out a patent, as he believed the Government which had educated him was entitled to his services.

**BENTON**, THOMAS HART, born near Hillsborough, Orange county, N. C., March 14, 1782, died at Washington, D. C., April 10, 1858. On account of his father's death when he was but eight years old, Thomas had few educational advantages. He was able to attend a grammar school and to spend some little time at the University of North Carolina. He studied law and was elected to the legislature. At about this time he quarreled with Jackson, who had heretofore been his warm friend. The trouble was made up; but Mr. Benton, having started the "Missouri Inquirer," was a participant in several duels, in one of which he killed his antagonist. In after-life he deeply regretted the act. Mr. Benton was a leader in his party, and in 1820 was chosen United States Senator from the new State of Missouri. He was influential in passing laws in regard to unoccupied western land, which were of such a nature as to encourage settlers to take up claims. Another benevolent measure in which he was actively engaged was the throwing open to settlers the salt and mineral lands of Missouri, which belonged to the national government. Many beneficial public measures were fostered by him; he

advocated a railroad to the Pacific, encouraged exploration of the West, advocated a friendly policy with the Indians, and planned for the establishment of post-roads. When President Jackson, in his first annual address, advocated the withdrawal of public moneys from the national bank and placing it in State banks, a business panic was threatened. Col. Benton at this crisis made an exhaustive study of the financial question, and then advocated the adoption of gold and silver as a currency basis. His speeches on the money question were the most eloquent ever delivered by him. The sub-treasury system now in use is a development of Col. Benton's views put in practice. During the Mexican war his advice was largely followed by President Polk, who wished to put him in full command of the army. When the slavery question came up with regard to the newly-acquired Mexican States, there commenced a bitter hostility between Benton and Calhoun, which was intensified by the "nullification" measures. Through the influence of his enemies, Col. Benton lost party favor, and in a contest for senatorship, and subsequently for the office of Governor, he was defeated (1856). The last years of his life were devoted to literary work. *Thirty Years' View* is descriptive of the time in which he represented his State in the U. S. Senate. He wrote *An Abridgment of the Debates of Congress*, and *An Examination of the Dred Scott Case*. Col. Benton's wife had a paralytic stroke in 1844, and from that time he never went to a place of amusement. Although surrounded by many temptations, he never indulged in liquor, gaming or tobacco, saying simply that his mother had desired him not to form these habits. See *Britannica*, Vol. XXIII, p. 788.

**BENTON**, the county-seat of Franklin county, Ill., situated on a railroad, 77 miles northeast of Cairo and 90 miles southeast of St. Louis, Mo. It has churches, a high school, a bank, a jail and several manufactories.

**BENTON HARBOR**, an important trading and manufacturing town of Michigan, situated on St. Joseph's River, near its entrance into Lake Michigan. It is the commercial center of an extensive fruit-growing industry, and contains important manufactories of fruit-baskets, canned fruit, furniture, lumber and flour.

**BENTONVILLE**, a town of Arkansas, county-seat of Benton county. It contains a number of manufactories, and is extensively engaged in the tobacco trade.

**BENTONSVILLE**, a small village of Johnston county, N. C., famous for a battle between the armies of General Sherman and General Johnston, March 21, 1865.

**BENYOWSKY**, DE, MAURICE AUGUSTUS, count, born in Hungary in 1741, died in battle in 1786. He was a man of remarkable character and extraordinary fortunes. He took part in the Seven Years' War, and in 1767 joined the Polish confederation, taking a prominent part in the campaign against the Russians until May, 1769, when he was captured; about seven months later, after being confined in several Russian prisons, he was banished, first to Siberia, and then to Kamchatka. He escaped from the latter place to France in May, 1771, and shortly after, by proposal of the French government, he established a colony at Madagascar, himself arriving on the island in February, 1774. He was proclaimed king by the chiefs in conclave in 1776, and adopted the costume of the natives, but he fell into contention with the French government of the Isle of France, and was at last slain.

**BENZENE**. See *Britannica*, Vol. V, pp. 560, *et seq.* Benzene is extensively employed in the arts



as a solvent for fats, gums and resins, and as the basis for the manufacture of aniline and the aniline colors. It is also the source of many medicinal compounds, especially of salicylic and benzoic acids.

**BENZERTA**, or **BIZERTA**, **LAKES** of, the ancient *Hippontitis Palus* and *Sisara Palus*, two lakes within the dominions of Tunis, and about 30 miles from the coast. They are each about ten miles long, and the larger one, which is clear and salt, is six miles broad; the smaller, which is turbid and fresh, is three miles broad. They are two miles apart, but united by a channel. Tunis is supplied with fish mainly from these lakes.

**BENZILE**, or **BENZOYLE**, the radical or root of the group of substances which comprehends as members the hydride of benzoyle, benzoic acid, benzin and benzole. It is prepared by passing a stream of chlorine gas through fused benzoil, or by heating one part of benzoil with two parts of concentrated nitric acid. Benzile floats to the upper part of the liquid mixture as a liquid oil, which solidifies on cooling. It is a tasteless solid, insoluble in water, but readily dissolved by ether and alcohol.

**BEOWULF**, an Anglo-Saxon epic poem, one of the greatest literary curiosities and most remarkable historical monuments in existence. The events narrated probably occurred in the middle of the 6th century; and, as the legends relate to the Teutonic peoples who afterwards inhabited England, it is supposed that the poem was brought by them from the continent. The only known copy is in the British Museum. See *Britannica*, Vol. VIII, pp. 403, 404.

**BEQUEATH**, to leave personal property by will or testament to another. In the case of real estate the correct term is devise. Neither of these words is essential to the validity of a will, although it is usual and safe so to use them; other words, showing clearly the intention of the testator, will suffice.

**BERAT**, a town of Albania, European Turkey, in the pashalic of Avlona, situated on the banks of the Tuberathi, about 30 miles northeast of the seaport of the same name. The valley in which Berat stands is very fertile, producing large quantities of grain, oil and wine. The population is about 10,000, two-thirds of whom are Greek, the remainder Turks. It has a citadel, and traces of ancient Greek buildings.

**BERBERIDEÆ**, a natural order of exogenous plants, of which the different species of Barberry are the best known examples. Many of the plants are spiny shrubs. This order, nearly allied to *Vitaceæ*, contains more than 100 species.

**BERCHTA**, the name given, in the south of Germany and Switzerland, to a mythological being who was apparently the same as Hulda in Northern Germany. The being represented originally one of the kindly and benign aspects of the Unseen powers, but in the course of time she became rather an object of terror; the difference probably arising from the circumstance that the influence of Christianity was felt, and the pagan deities were converted into demons. Lady Berchta was supposed to have the oversight of spinners. The last day of the year was sacred to her, and any flax left on the distaff that day she spoiled. Her festival was kept with a kind of meager fare—oatmeal gruel and fish. In some places she was represented as having a long iron nose and an immensely large foot. That she was once an object of worship is shown by the numerous springs, etc., that bear her name in Salzburg and elsewhere. Many of the Sagas of Berchta were transferred to the famous Berthas of history and fable. The numerous stories of the "White

Lady" have doubtless their root in the ancient Berchta.

**BERCK-SUR-MER**, a harbor and bathing resort in the French department of Pas-de-Calais, 22 miles south of Boulogne, with some ship-building and sail-making. Population, 5,187.

**BERCY**, a town of France, in the department of the Seine, situated on the right bank of the river of the same name. It forms a suburb of Paris, and has a large business in wines and other liquors. Population, about 15,000.

**BEREA**, a village of Kentucky, about 100 miles south of Cincinnati, the seat of Berea College, founded in 1858, in the interests of abolition by Rev. John G. Fee, a zealous advocate of the anti-slavery cause.

**BEREA**, a town of Ohio, 13 miles southwest of Cleveland. Baldwin University and German Wallace College (both under the care of the Methodist church) are situated here. Large quantities of sandstone are quarried in the vicinity.

**BEREANS**, a sect of Christians who originated in Scotland in the 18th century, but are now almost extinct. Their name is derived from the circumstance that the inhabitants of Berea "received the Word with all readiness of mind, and searched the Scriptures daily" (Acts xvii, 2). They believe that the knowledge of God's existence and character is derived from the Bible alone, and not from reason or Nature; that the Psalms of David do not relate to David at all, but exclusively to Christ. That assurance is of the essence of faith, and that unbelief is the unpardonable sin. Ordinarily, in their points of doctrine, they are Calvinistic. The founder of the Bereans was the Rev. John Barclay, a native of Perthshire. From him they also received the name of Barclayans. See *Britannica*, Vol. III, p. 369.

**BEREGH**, a town and a county of Hungary. The county is 1440 square miles in extent, is quite mountainous, and the chief production is wine.

**BEREGONIUM** is a misprint in the Ulm edition of Ptolemy's Geography (1486) for *Rerigonium*, a town of Novantæ, now identified with the fort of Innermessan, on the east shore of the Loch Ryan.

**BERENGAR I**, king of Italy, the son of Eberhard, Duke of Friuli and of Gisela, daughter of the Emperor Louis the Pious. He was assassinated in 924.

**BERENGAR II**, son of Adalbert, Count of Ivrea, succeeded to his father's possessions in 925, and married Willa, niece of Hugo, King of Italy, in 934. Incited by his ambitious and unscrupulous wife, he conspired against Hugo, and in consequence was compelled to flee to Germany, where he was received in a friendly manner by the Emperor Otto I. In 945 he recrossed the Alps at the head of an army, but, instead of assuming the crown himself, he handed it over to Lothaire, the son of Hugo. On the death of Lothaire, who was probably poisoned by Willa, he allowed himself to be crowned, along with his son, Adalbert, in 950. Two years later he engaged in war with the Emperor Otto, who sent his son Ludolf against him. Ludolf was successful, but died of poison administered, as was believed, by Willa in 957. Berengar again mounted the throne, but behaved with such intolerable tyranny that his subjects called in the aid of the emperor, who took possession of the country in 961. Berengar was sent as a prisoner to Bamberg, in Bavaria, where he died in 966. His wife, Willa, retired into a convent, and his three sons died in exile.

**BERESFORD**, **WILLIAM CARR**, viscount (1768-1854), an eminent English military commander. He entered the army in 1785, and twenty-five years

later was made a knight of the bath in acknowledgment of his aid at the battle of Busaco. The year following (1811) he was placed in command during the battle of Albuera, which he won, receiving for this the thanks of Parliament. He became baron in May, 1814, and in 1823 he was created viscount.

**BERESLAV**, a thriving town in the Russian government of Kherson, on the Dniester. Population 11,000.

**BERETTYO-UJFALU**, a market town of Hungary, in the county of Bihar, with a population of 6,000.

**BEREZNA**, a town of Russia, in the government of Tchernigov, on the Desna. Population, 10,000.

**BEREZOV**, or **BERESOFF** ("The Town of Birch Trees"), an important town on the left bank of the Sosva, in the government of Tobolsk, Siberia. Although it is a small place it is the only fur and skin trading station throughout a large tract of country. Prince Menschikoff, the favorite of Peter the Great, having been banished to Siberia, died and was buried here. His grave being opened ninety years after, it was discovered that his body, clothed in the uniform of the time, was undecayed. A fair, which is largely attended, is held here annually. See *Britannica*, Vol. III, p. 587.

**BEREZOVSK**, a village in the Russian province of Perm, near Ekaterinburg, which gives name to a famous gold-field, worked since 1744. The mines are on the eastern slopes of the middle Ural chain, and the field is above five miles long. The washings on the Berezovka River are also very productive.

**BERG**, **BURG**, or **BURGH**, roots entering into composition of many names of places. *Berg* (in German) means "hill," and "mountain," and *burg* or *burgh* means "fort," "castle," "citadel," probably from being situated on a hill or eminence.

**BERGA**, a town of Catalonia, Spain, 52 miles northwest of Barcelona. Population, 6,000.

**BERGAMOT**, a name of various kinds of pear, to which, however, no common distinctive character can be assigned. The proper Bergamot pear is flattish, rough-skinned, with a long stalk, a very juicy pulp, as soft as butter, of an extremely pleasant flavor, and is esteemed one of the best dessert pears.

**BERGEDORF** ("Hill Village"), a manor and borough of Germany, belonging to Hamburg, since 1867. The people are well-conditioned and industrious, and engaged in agriculture, cultivating fruit and vegetables for the London as well as the Hamburg market. See *Britannica*, Vol. XI, p. 404.

**BERGERAC**, **SAVINIEN CYRANO**, born in France, about 1620, died in 1655, from a wound received in a duel. He was a poet, novelist, and dramatist, and also a notorious duelist. He was admired as a writer of romance, and his works of this character were much read in the 17th century. As a poet and dramatist, he ranks second only to his contemporaries, Molière and Racine.

**BERGH**, **HENRY**, born in New York city in 1823, died March 12, 1888. He was of German descent, and his father was a wealthy ship-builder for the government. Henry Bergh and his brother succeeded to the ship-building business at the father's death, but it was not to the taste of Henry Bergh, so he abandoned the business and entered Columbia College. Before completing the course he went to Europe, where he spent five years. In 1862 he was appointed secretary of legation at St. Petersburg. Ill-health compelled him to resign two years later and he went to London, where, among other

famous people, he met the Earl of Harrowby, President of the Royal Society for the prevention of cruelty to animals. Mr. Bergh was much interested in the welfare of dumb animals; possibly the sights witnessed in St. Petersburg first led him to a consideration of this subject. Returning to New York in 1864 he set about organizing a society for the prevention of cruelty to animals. The following year the society was formed with Mr. Bergh as president. The work done by this society has been a noble one. Mr. and Mrs. Bergh gave largely of their abundance means for the work, and in 1871 Louis Bunard, a Frenchman residing in New York, died leaving a legacy of \$150,000 to the society. Through Mr. Bergh's influence similar societies have been formed in several cities, while 39 States have adopted laws for the protection of animals. In 1874 his attention was called to the inhumanity sometimes practiced upon children, and he founded the Society for the Prevention of Cruelty to Children. Mr. Bergh wrote plays, some poetry and a few sketches; but the work for which he will always be remembered is that in regard to kind treatment of children and animals.

**BERGHAUS**, **HEINRICH**, born in Rhenish Prussia in 1797, died in 1884. He was one of the most active promoters of geographical knowledge. His *Physical Atlas* (90 plates, Gotha, 1838-48) is the most prominent of his cartographical works. He also edited several geographical periodicals.

**BERGHAUS**, **HERMANN**, a German cartographer, of rare ability, connected for more than forty years with the great map-making and publishing house which bears his name in Gotha, Germany. For many years and reaching to the date of his death, Dec. 3, 1890, he was regarded as the highest authority in every department of geography. He was not a traveler, but a recluse, devoting a powerful genius and an indefatigable application to the researches of traveling and other geographers, ancient and modern. He never wearied in enlarging his fund of knowledge concerning all localities, however humble, of all countries, and brought his information down to the latest dates. In his comfortable work-room in Gotha he could furnish, without delay and without mistake, exact information in response to all inquiries in his professional line. One of his earliest tasks was the collection of statistics with regard to the measurement of heights, and one of the best-known monuments of his genius is his hypsometric and orographic map of Central Europe, which he published in 1857, which marked an epoch in map-making. One of his greatest works was his eight-sheet map of the world on Mercator's projection, which, appearing in 1863, has been sold by thousands all over the world, eleven editions having been issued under his direction. Undoubtedly his greatest work was that which he had not quite completed at the time of his death. It was the new edition of the "Berghaus Physical Atlas," first produced by his great uncle Heinrich, Berghaus, in 1852.

**BERGLER**, **JOSEPH**, an historical painter of considerable note, born at Salzburg in 1753, died in 1829. He was appointed director of the Academy of Prague in 1800. The impetus which he gave to the fine arts in Bohemia was very marked, and his school furnished a goodly number of eminent artists.

**BERGMANN**, **FREDERICK WILLIAM**, an eminent German linguist, born in Strasburg in 1812. In connection with theology he studied philology, in his native city. He continued his linguistic studies in Göttingen, Berlin and Paris, and in 1838 he became professor of foreign literature in the University of Strasburg. He has written numer-



ous important works on the Semitic and other languages.

**BERGMEHL**, or **MOUNTAIN FLOUR**, a deposit of white or cream-colored powder of extreme fineness, composed almost entirely of the indestructible siliceous frustules, or cell-walls of *Diatomacea*. From its resemblance to flour it has been mixed with ordinary food and used by the inhabitants of Norway and Sweden, who suppose it to be nutritious. In Maryland and Eastern Virginia an extensive bed of this organic matter occurs nearly 100 miles long, and 30 feet thick.

**BERGRÖE**, **WILHELM**, a distinguished Danish writer, born in Copenhagen in 1835. In early life he became noted as a zoologist; but the use of the microscope induced temporary blindness, and he turned his attention to poetry, and afterwards to writing of novels. His productions were very popular.

**BERGUES**, a town of France, in the department of the Nord, five miles from Dunkirk. The canal of Bergues, which admits vessels of 300 tons burden, unites it with Dunkirk and the sea, and its favorable situation makes it the entrepot of the produce of the adjoining country. It has manufactories of soap, tobacco, earthenware, and also sugar and salt refineries. Population, 5,500.

**BERGYLT**, a fish of the Mailed Cheek family, or *Sclerogenidae*, the family to which gurnards and sticklebacks belong, but so much resembling the perch that it was formerly called Sea-perch. It is an inhabitant of all the Northern seas, is of a red color; its gill-covers are armed with short spines. It attains a length of two feet and upwards. It is good for food, and the Greenlanders use it not only in a fresh but also in a dried state.

**BERHAMPUR**, the name of two towns in British India.—(1) Berhampur in Madras is a military station in the district of Ganjam, 18 miles southwest of the town of Ganjam, and but nine from the coast. The climate is very healthful, and there is some trade in sugar and in silk fabrics. Population, about 24,000.—(2) Berhampur in Bengal, situated on the left bank of the Bhagirathi, five miles below Murshidabad. It was long one of the principal military stations in British India, and the barracks, now largely devoted to other uses, still form the most important feature of the town. In 1857 Berhampur was the scene of the first open act of mutiny. Population, about 24,000.

**BERI**, a town of India, in the British district of Rohtak, Punjab, 36 miles northwest of Delhi. It is a considerable trade center with two large fairs, in February and October. Population, about 10,000.—The state of Beri, in Bundelkhand, has an area of about thirty square miles, and a population of 5,000.

**BERING**, **IVAN IVANOVICH**. See *Britannica*, Vol. XIX, p. 318; also Vol. III, pp. 509-10. "The term *Bering Sea* has been variously written Behring Sea, Bhering Sea, Beering Sea, Bering Sea, as well as Behring's Sea, Beering's Sea, etc. This name was given to the sea in honor of its first explorer. Similarly the strait which connects it with the Arctic Ocean, an island in the sea, and a bay on the northwest coast of America, have received the name Bering.

"When the Czar Peter the Great determined to send out an exploring expedition to ascertain whether Asia and America were united by land he selected to lead this expedition Captain Commander Ivan Ivanovich Bering. Bering was the son of Jons Svendsen by his second wife, Anne Pedersdatter Bering, and was born at Horsens, in Jutland, in the summer of 1681. On his mother's side he was descended from the distinguished Be-

ring family, which during the 17th and 18th centuries flourished in various parts of Denmark, and included a number of ministers and judicial officers. Baptized on the 12th of August, 1681, he received the baptismal name Vitus Jonassen Bering. On entering the Russian navy, however, he took, as was the custom of the Danish and Norwegian officers serving in Russia, a new or Russianized form of name. This form is Ivan Ivanovich Bering. The name Ivanovich is an exact translation of Jonassen—in English, Johnson or John's son. All the Russian and Danish records agree as to the spelling of the family name; both in Danish and in Russian it is Bering. His autograph is always written Bering.

"The insertion of an *h* in the name, giving the form Behring, appears to have been made in Germany.

"In 1748 was published Harris's *Collection of Voyages*, in two folio volumes. In the second volume, pages 1016-41, is contained 'A distinct account of part of the northeast frontier of the Russian Empire, commonly called the country of Kamschatka or Kamschatska, including the voyages of Captain Behring for discovering toward the east, etc., collected from the best authorities, both printed and manuscript.' This account was prepared by Dr. Campbell, who made use of the form Behring. From this it may be inferred, as pointed out by Mr. Wm. H. Dall, that Dr. Campbell did not have access to original documents, but got his material from German sources or from German translations of the original. As Harris's *Voyages* is an elaborate work, long accepted as a standard, the use of the form Behring gained wide adoption among English-speaking people. That the form Bering should be adopted, however, appears—(1), because it is the form always used by Bering himself, by his ancestors for five generations at least, and by his descendants; (2), because it is the form almost, though not quite, universally adopted in all non-English works; and (3), because even in English works it is gradually superseding the form Behring."—[*Bulletin U. S. Board on Geographic Names*, Dec. 31, 1890.]

**BERJA**, a town of Spain, in the province of Andalusia, at the foot of the Sierra de Gador, 22 miles west of Almería. It has manufactories of linen fabrics, hats, hardware and leather, and a trade in wine and oil. Population, about 8,000, chiefly engaged in mining lead, which is plentiful in the Sierra de Gador.

**BERKELEY**, an important educational town of California, beautifully situated near the Bay of San Francisco, about five miles north of Oakland. It is the seat of the University of California, the State Agricultural College, and the Institution for the Deaf, Dumb and Blind.

**BERKELEY**, a town five miles north of Oakland, in Alameda county, California. The University of California, the California Institution for the Deaf, Dumb and Blind, and the State Agricultural College are here located.

**BERKELEY**, **MILES JOSEPH** (1803-1889), a distinguished English botanist. He was educated for the church, and obtained a number of ecclesiastical preferments; but his fame rests upon his botanical researches and writings.

**BERKELEY**, **SIR WILLIAM**, colonial governor of Virginia, born near London, England, about 1610; died at Twickenham, July 13, 1677. He was highly connected, a graduate of Oxford, a traveler and accomplished courtier. The king honored him with a commission to Canada in 1632, and in 1641 appointed him governor of Virginia. During his first term of office he won the regard of the people and managed business with great shrewdness. When

Cromwell became Protector Berkeley influenced the people not to acknowledge his authority, and a fleet was sent from England to bring the colony and its governor to terms. Berkeley's diplomacy soon made matters smooth with the home government, but he had to resign his office. At the restoration Charles II reinstated Berkeley, but his second term of office was unsatisfactory. The so-called "Bacon rebellion" arose, provoked no doubt by Berkeley's infidelity to the Indians and his duplicity with regard to the patriot Bacon. The governor saw how unpopular he was making himself by his erratic conduct and he became bitter and inhuman. After Bacon's death he persecuted his followers and executed them with such indecent haste that the king said he had "taken more lives in that naked country than I have for the murder of my father." Berkeley was opposed to free schools, printing, and religious liberty. Charles II recalled him, intending to examine into the reports of his harsh measures, but Berkeley died soon after his return to Europe.

**BERKELEY SOUND**, the most frequented inlet of East Falkland Island, near its northeast extremity. It is in latitude  $51^{\circ} 30'$  south, and longitude  $57^{\circ} 56'$  west. Though it is difficult to enter, yet it contains several excellent harbors. Its shores yield ample supplies of water, cattle, and vegetables.

**BERKOVITZA**, the chief town of a district in western Bulgaria, 40 miles northwest of Sofia, situated on a small tributary of the Danube. Population, 5,500.

**BERLAD**, a town of Lower Moldavia, on the Burlad River, 40 miles above its junction with the Sereth. It is an important place, connected with Braila by rail, and has a brisk trade. Population, 27,000.

**BERLENGAS**, a group of rocky islands in the Atlantic off the west coast of the Portuguese province of Estremadura, 10 miles northwest of Peniche. The principal one, Berlenga, is fortified, and has been used as a state prison.

**BERLICHINGEN**, VON, GOETZ or GOTTFRIED "of the Iron Hand," born in Wurtemberg in 1480, died in 1562. His career was varied, and with the exception of Ulrich von Hutten, he may be regarded as the last worthy representative of the chivalry of the Middle Ages, then expiring.

**BERLIN**, a town of Ontario, Canada, county-seat of Waterloo county, is situated on Grand River, about 60 miles west of Toronto. It contains a number of manufactories, the principal being buttons and malt liquors.

**BERLIN**, a city of Wisconsin, situated on Fox River, about a hundred miles northwest of Milwaukee. Here are extensive foundries and manufactories of turbine-wheels, woolen goods, flour, whips, boots and shoes and leather. Cranberries and dairy products are among the principal articles of trade.

**BERLIN SPIRIT**, a coarse whisky made chiefly from vegetables. Because of its cheapness it has been largely used in the making of brandy, and in mixing low wines.

**BERM**, in fortification, a pathway from three to eight feet in width, at the bottom of the outside of a rampart, where it joins the scarp or inner side of the ditch. It is almost on a level with the natural surface of the ground, and serves in part as a passage way for the troops of the garrison, and in part as a means of preventing the ditch from being filled with earth and rubbish.

**BERMONDSEY**, a southeast suburb of London, on the south bank of the Thames. It has extensive tan-yards and wharfs. Population, about 80,000.

**BERMUDA HUNDRED**, a village of Virginia, situated on the right bank of the James River, above the mouth of the Appomattox. It became known as the headquarters of General Butler during the siege of Petersburg.

**BERMUDAS**, a British colonial possession consisting of 365 small islands in the Atlantic ocean, 568 miles east of North Carolina, and 677 miles from New York. Total area, 20 square miles (12,000 acres—4,000 under cultivation). Population in 1889, 15,534, including 6,155 whites. Capital, Hamilton, with a population of about 8,000. For early history and description, see *Britannica* Vol. III, pp. 599, 600.

The executive administration is in the hands of a governor, assisted by a council of six members also appointed by the Crown. There is also a legislative council of nine appointed by the Crown, and a representative house of assembly of 36 members.

There were, in 1890, 47 schools with about 1,400 students, 23 of these schools receiving government grants to the amount of \$8,250 annually. Average strength of imperial troops 1,500. In 1890 the revenues were estimated at \$145,025, and the expenditure at \$150,380. Public debt in 1889, \$43,070. The value of onions exported in 1888 was \$296,000; lily bulbs, \$21,645; and potatoes, \$135,000. The total exports in 1888 amounted to \$498,250.

In 1888 the total tonnage of vessels entered and cleared was 228,385, of which 199,199 were British. There are 32 miles of telegraph wire, and 15 of cable; in 1888 the number of messages sent was 22,467. There is also a private telephone company, which has over 120 subscribers and upwards of 300 miles of wire in line.

The Bermudas occupy areas of about 15 miles by 6, and are separated by very narrow channels. Only 18 or 20 are inhabited, and only five are considerable size. They are inclosed on three sides by coral reefs, nearly all under water, some of them extending 18 miles away.

Hamilton, Bermuda, has long been a place of pleasure and health resort by many persons from the United States and Canada. The climate is exceedingly attractive, especially in winter. Visitors find there ample hotel accommodations, and the voyage by steamer from New York generally free from peril by storm and helpful to health. Steamers ply regularly between Hamilton and New York, the voyage requiring about three days.

**BERMUDEZ**, a state in the northeast part of Venezuela, between the Orinoco and the Caribbean Sea formed in 1881 from the former states and present sections of Barcelona, Cumana, and Maturin. Area, 32,128 square miles; population, 55,677.

**BERNALDA**, a town in South Italy, in the province of Potenza. Population, 6,976.

**BERNALILLO**, a wealthy agricultural and commercial town of New Mexico, situated on the Rio Grande, about fifteen miles above Albuquerque. It is an old town, and the seat of a convent and a college. It is an important outfitting station for the adjacent mining regions, and is the commercial and manufacturing center of an extensive wine-producing and fruit-growing district.

**BERNARD**, ABBOT of CLUNY, born in Morlaix, Brittany, about 1100. He was the author of *Jerusalem the Golden*, and other hymns, which Dr. Neale translated from the *De Contemptu Mundi*.

**BERNARD**, CLAUDE, born at Saint-Julien, in the department of the Rhone, died in 1878. He was an eminent physiologist, and held several high positions in the colleges of France, devoting himself to experimental researches in physiology. He discovered the glycogenic functions of the liver.



BERNARD DOG, GREAT ST. See Britannica, Vol. VII, p. 327.

BERNARD, GREAT ST., a noted pass of the Pennine Alps, over 8,000 feet above sea level. Napoleon crossed the Alps at this point in 1800, at the head of an army of 30,000 men. At the summit is the celebrated St. Bernard hospice.

BERNARD, SIR FRANCIS, born in Nettleham, Lincoln, England, in 1714, died at Aylesbury, England, June 16, 1779. He graduated at Oxford, and served in different offices of importance until 1768, when he was appointed governor of New Jersey. He was appointed to the same office in Massachusetts Bay Colony. He administered the office satisfactorily in the former colony, and for the first nine years in the latter place. The library of Harvard College was burned in 1764; and the governor, who took quite an interest in the college (his third son graduated from the institution in 1767), assisted in procuring funds for its restoration. About that time two political parties arose—a royalist faction and a popular party. In trying to strengthen the former, Governor Bernard executed harsh measures and put down popular leaders, thereby rousing great indignation and precipitating the final struggle between the mother country and her colonies. It is affirmed that he did more to hasten the Revolution than any other man. He had a quick, ungovernable temper—the unhappy faculty of doing just those things which would harass a people already on the brink of mutiny. Conciliatory measures he never tried. The king recalled him, yet he remained nominal governor for two years after his return to England.

BERNAUER, AGNES, the daughter of a citizen of Augsburg, and the heroine of a sad romance of the 15th century. Duke Albrecht of Bavaria, only son of the reigning Duke Ernst, seeing her at a tournament, fell in love with her beauty, and they were secretly married. When it was proposed that he should marry Anna, daughter of Erich, duke of Brunswick, Albrecht declared his marriage with Agnes Bernauer, and brought her to the Castle of Straubing as duchess of Bavaria. Duke William, Albrecht's uncle, befriended the young people; but after his death, and during the absence of Albrecht, Agnes was arrested by order of her father-in-law, charged with sorcery, and drowned in the Danube. On his return her husband, maddened by the outrage, gathered the enemies of his father, and taking arms against Duke Ernst they devastated the country. See Britannica, Vol. XXII, p. 591.

BERNE-BELLECOUR, ETIENNE, a French artist, born at Boulogne-sur-mer in 1838. His earlier works were portraits and landscapes, but his fame rests upon his later *genre* and military paintings.

BERNHARD, DUKE OF WEIMAR (1604-1639), a celebrated German general, the youngest of eight sons of John, third duke of Saxe-Weimar. On the outbreak of the Thirty Years' War he took the side of Protestantism, and distinguished himself in 1622 at the battle of Wimpfen. He became colonel in the army of Christian IV, king of Denmark. He took part in the bold expedition of Mansfeld through Silesia to Hungary, and after the death of the latter he reunited himself with the Danes under the markgraf of Baden-Durlach. At the solicitation of his brothers he withdrew from the Danish service, and returned to Weimar in 1628. Three years later Gustavus Adolphus made his appearance in Germany, and Bernhard was one of the first who flew to his standard. After a brilliant career he became suddenly ill, and died at Neuburg on the Rhine in 1639. He was probably poisoned by his physician, who is supposed to have been in the pay of France.

BERNHARDT, ROSINE, called Sarah, a French actress, born of Jewish parents in Paris, Oct. 22, 1844. She was baptized into the Christian faith, and brought up in a convent at Versailles. Entering the Paris conservatoire in 1858, she gained second prizes for both tragedy and comedy, and in 1862 made her début as "Iphigenie" at the theater Français, but attracted so little notice that she soon left the theater, only to meet with still less success in burlesque at the Gymnase and Porte St. Martin. In 1867 she played minor parts at the Odeon, and became famous by her impersonation of the "Queen of Spain" in *Ruy Blas*, and of "Zanetto" in Coppée's *Passant*. She was called to the Theater Français in 1872, and after 1879 made annual appearances, with marked success in London. Her tours in North and South America, in Italy, Russia, etc., were also peculiarly successful; but her essay at the management of a Paris theater involved her in heavy debt. In 1882 she was married to M. Jacques Daria, or d'Amala, a Greek actor, from whom she was divorced shortly afterwards. Her later successes as an actress have been in *La Tosca*, *Joan of Arc* and *Cleopatra*. She is now (1891) filling her second season of engagements in the United States. Madame Bernhardt is probably the greatest *tragedienne* since Rachel, and in comedy also she ranks as a finished actress. Her talent as an artist is considerable, and both paintings and statues from her studio have appeared in the Salon.

BERNHARDY, GOTTFRIED, a German scholar, born of Jewish parents near Frankfort in 1800, died at Halle, May 14, 1875. He was educated at Berlin, and in 1829 became director of the philological seminary at Halle. Of his numerous philological works may be mentioned his *Syntaxis der Griechischen Sprache* (1829); *Paralipomena Syntaxis Græcæ* (1854); and the critical edition of *Suidæ Lexicon* (4 volumes, 1834-53). His works on Roman and Greek literature, especially the history of the latter, are also of high value.

BERNICIA, a form of the word *Bryneich*, used to indicate the northern part of what became the kingdom of Northumbria, the part north of the Tees. The Anglian kingdom of Bernicia is said to have been founded by Ida, who made his capital at Bamborough about A. D. 550. See Britannica, Vol. VIII p. 270; Vol. XVII, p. 568.

BERNIER, FRANÇOIS, a French physician and traveler, born at Angers in France, died at Paris in 1688. Having taken his degree of doctor, he departed for the East in 1654, and visited Syria, Egypt, Arabia and India; in the last he resided for 12 years in the capacity of physician to Aurungzebe. He published an account of his travels in 1670. The work is delightful in style as well as in the description of places, and clear in exposition of the causes of those political events that carried Aurungzebe to the throne.

BERNINA, a mountain of the Rhetian Alps, upwards of 13,000 feet high, in the Swiss canton of Grisons, with a remarkable and extensive glacier, Morteratsch. The Bernina Pass, which is 7,628 feet high, unites the valleys of the Engadine and Bregaglia on the north, with Valteline on the south, but is dangerous on account of avalanches. See Britannica, Vol. XXIV, p. 45.

BERNSTEIN, GEORGE HEINRICH, a distinguished orientalist, born at Kospeda, near Jena, in 1787, died in 1860. Bernstein devoted himself to the study of theology, philosophy, and Eastern languages, and his greatest achievements were in Syriac literature. He contemplated publishing a great Syriac lexicon, but did not live to complete the work.

BEROË, one of the commonest representatives of the most intensely active sub-class of *Celesterrates*—

the *Ctenophora*. It is the type of the small family *Beroidea*. These are free-swimming pelagic animals, of great delicacy and beauty, generally of more or less cylindrical form and without any trace of skeleton. They are transparent and often beautifully colored, and one of the most brilliant examples of phosphorescent marine animals. During the day they descend to deeper water, but come to the surface at night. The distribution of the genus, which includes three certain species, is very wide. See *Britannica*, Vol. I, p. 132.

BERRE, ETANG DE, an extensive lagoon of France, department Bouches-du-Rhône, with large salt-works and eel-fisheries. It discharges its surplus waters into the sea by the Port-du-Bouc.

BERRI, or BERRY, formerly a province of Central France, now forming the departments of Indre and Cher. Having come, in 1100, into the possession of the French crown, it was raised to a duchy in 1360, and gave title at various times to French princes, the younger son of Charles X being the last who held it.

BERRYVILLE, a small village in the Shenandoah Valley, the county-seat of Clarke county, Va. It is sometimes called Battletown on account of having been the scene of many Revolutionary contests of General Morgan.

BERSAGLIERI, the Italian name for riflemen and sharpshooters of the Sardinian army. During the Italian war of 1859 the *bersaglieri* were engaged in many operations requiring dash and brilliancy.

BERSERKER, or BERSERK, derived from the Icelandic *berserkr*, meaning either "bare-sark," without a shirt, or, more probably, "bear-sark," having a bear's shirt or hide. Berserker, grandson of the eight-handed Starkader and the beautiful Alfhilde of Norse mythology, is represented as a hero who, despising mail and helmet, went always into battle unharnessed, his fury serving instead of defensive armor. The *berserkers* of later times were a class of warriors who are said to have performed extraordinary feats in battle under the influence of fits of fury called *berserkgang*, "Berserker's rage," which made them houl like wild beasts, foam at the mouth, and gnaw the rims of their shields, and was supposed to endue them with superhuman strength and to render them proof against fire and steel.

BERT, PAUL, a French statesman and physiologist, born at Auxerre in 1833, died in 1886. He studied law and medicine, and occupied successively the chairs of Physiology at Bordeaux and Paris. Entering political life in 1870, on the proclamation of the Republic, he was four times re-elected to the Chamber, and during the premiership of Gambetta held the post of minister of public instruction and worship. While engaged in public life, M. Bert still pursued with ardor his scientific investigations, attracting world-wide attention by his experiments in vivisection. He was appointed by the French ministry to the governorship of Tonquin and Anam in 1886, but held the position for a short time only, his death occurring in November of the same year.

BERTH, in nautical language, a term nearly equivalent to *room* or *space*; a ship's berth is the space which she occupies when at anchor, including a small breadth of sea all around her. The same name is also given to a messing or sleeping-room on board ship, in a sense not very different from that of the word *cabin*.

BERTHA, the name of several famous women of the Middle Ages, half-historical and half-fabulous. St. Bertha, whose day is kept on the 4th of July, was the beautiful and pious daughter of King Charibert, of the Franks, who, having married (A. D. 560) Ethelbert, king of Kent, became the means of

his conversion and of the spread of Christianity among the Anglo-Saxons.

BERTHIER, ALEXANDRE, Prince of Neuchatel and Wagram, and marshal of the French Empire, born at Versailles in 1763, died in 1815. He joined the army in 1770, and with LaFayette took part in the American Revolution. He accompanied Napoleon to Egypt as chief of staff. At the revolution of 18th Brumaire (1790), he became war minister. He was Napoleon's proxy in the marriage of Maria Louisa, at Vienna, in 1810. He held the rank of chief of the staff, and also that of quartermaster-general during the campaigns of 1812, 1813, and 1814, and was continually at the Emperor's side. When Napoleon returned from Elba, Berthier left the service of Louis XVIII, preferring neutrality, and retired to Bamberg, Bavaria.

BERTIN, LOUIS FRANÇOIS, an eminent French journalist, born in Paris in 1766, died in 1841. He began writing for the press in 1793, and in 1799 set on foot the "Journal des Débats." His royalist principles offended the government of Napoleon, and cost him imprisonment and banishment to Elba, but he escaped to Rome, where he formed a friendship with Chateaubriand. In 1804 he returned to Paris, and resumed the editorship of the "Débats."

BERTRAND, HENRI GRATIEN, COUNT, born in Chateauroux in 1773, died in 1844. He was one of Napoleon's generals, distinguished for his faithfulness to the Emperor through all his fortunes. He early entered the armies of the Revolution as engineer. When the body of Napoleon was carried back to France in 1840, he had a part in the expedition.

BERVIC, CHARLES CLEMENT BALVAY, born at Paris in 1756, died in 1822. He was a distinguished engraver, and executed a full-length engraving of Louis XVI in 1790, through which he became famous. Other of his works, the engravings of the Laocoön, Regnault's *Education of Achilles*, and Guido's *Rape of Deianira*, display equal beauty of manipulation and higher power.

BERWICK, a manufacturing town in Columbia county, Pa., on the north branch of the Susquehanna River and the Lackwanna and Bloomsburg Railroad. It has a graded school, several churches, two potteries, foundries, a machine shop and a rolling mill.

BERWICK, NORTH, a seaport town of Haddingtonshire, at the entrance of the Firth of Forth, 19 miles east-northeast of Edinburgh. Corn is exported from it, and it is frequented as a bathing place. It includes the Bass Rock, North Berwick Law, and the ruins of Tantallon Castle, which is graphically described in Scott's *Marmion*. North Berwick Law is a conical hill of an elevation of 940 feet on the south, close to the town. Population, 4,000.

BESSEMER, Alabama, a flourishing and rapidly growing railway center in the iron region of the State; at this writing, 1891, it may be reached by eight railways. Population in 1890, 4,644; Precinct 33, including Bessemer, Sloss, and Woodward towns, 5,782.

BESSEMER CITY, Michigan, a new, thriving, and rapidly developing mining town in Gogebic county. Population of Bessemer in 1890, 2,666; township, 680.

BESSEMER, SIR HENRY, an English civil engineer and inventor, born at Chatham, in Hertfordshire, in 1813. His name is well known in connection with his principal invention, the Bessemer process of refining steel.

BESSIÈRES, JEAN BAPTISTE, Duke of Istria, and marshal of the French Empire, born at Preissac in



1768, died in 1813. He was promoted in succession to the ranks of general of brigade, general of division, and marshal of France, and in 1809 was created Duke of Istria for his services in Spain. He was mortally wounded on the morning of the battle of Lützen, while leading on foot the *tirailleurs* to reconnoiter the field from the defile of Rippach, and in him Bonaparte lost one of his best officers and his most faithful friend. The news of his death was concealed from the army throughout the day.

BESTIARES, the name given to a class of written books of great popularity in the Middle Ages, describing all the animals of creation, real or fabled, and generally illustrated by drawings. They were most in fashion during the 11th, 12th and 13th centuries. They served as encyclopædias of the zoology of those ages, but they had also another use. The symbolism which was then so much in vogue fastened spiritual meanings upon the several animals until every quality of good or evil in the soul of man had its type in the brute world. To the Bestiaries we must look for explanation of the strange creatures found sculptured on churches and buildings of the Middle Ages.

BETANZOS, a town of Spain, in the province of Corunna, 10 miles southeast of the city of the same name. Ancient granite gateways still defend its narrow streets; it has manufactories of linen, leather, and earthenware. Population, 5,000.

BETHANY, a small village of W. Va. in Brook county, on Buffalo Creek. Bethany College is located here; it was established in 1841 by Rev. Alexander Campbell, LL.D., founder of the "Disciples of Christ," otherwise known as the "Christians."

BETHANY COLLEGE, at Bethany, W. Va., was established in 1841, by the Rev. Alexander Campbell, LL.D., the founder of the denomination called "Christians," but better known as Disciples of Christ. This institution had in 1890 nine professors, two tutors and 164 collegiate students. It maintains also a theological department. The alumni number nearly 800, representing 32 States and several foreign countries. The three college buildings and apparatus are valued at \$300,000. The productive funds are nearly \$100,000, and efforts are in progress for increasing the latter to at least half a million dollars.

BETHEHEM, an educational and manufacturing town of Pennsylvania, the principal settlement in the United States of the Moravians, or "United Brethren," is pleasantly situated about 50 miles north of Philadelphia, on the left bank of the Lehigh River, across which a bridge connects it with South Bethlehem, the seat of Lehigh University. Bethlehem was founded in 1741. The first house, in which, in that year, Count Zinzendorf and his little band of Moravian brethren celebrated the festival of the Nativity was not taken down until 1823; and one of the first houses of the settlement is still standing. Besides containing a number of benevolent institutions conducted by the Moravians, Bethlehem is the seat of their theological seminary, boys' school, and young ladies' seminary. It was in the latter—used during the Revolution as a military hospital—that Lafayette was nursed after having been wounded at the battle of Brandywine. The principal manufactures of Bethlehem are flour, brass implements, boilers, shovels, and cigars.

BETHEHEMITES, the name of an order of monks at Cambridge, England, in the 13th century; also of an order founded in Guatemala in 1673. The followers of Jerome Huss were styled Bethlehemites, from Bethlehem church, in Prague, where their leader preached.

BETHLEN GABOR (1580-1629), a descendant of an ancient and eminent Protestant family of Upper

Hungary. He became distinguished during the troubles which distracted the principality in the reigns of the two Bathories, Sigismund and Gabriel. When the latter died, Bethlen Gabor became sovereign prince of Transylvania.

BETHNAL GREEN, an eastern suburb of London, since 1885 a parliamentary borough. It is largely peopled by silk-weavers, an offshoot of the Huguenot settlement in Spitalfields. Its museum, opened by the Queen in 1872, is a branch of the one at South Kensington. Population, 127,000.

BETHSAIDA, on the lake of Galilee, mentioned in Scripture as the city of Peter and Andrew and Philip, now a heap of ruins almost overgrown with grass.

BETH-SHEMESH, an ancient city of the Holy Land, about 15 miles southwest of Jerusalem. Ruins at the present village of Ain-Shems lead scholars to believe this was the site of Beth-Shemesh. Samson's exploits were performed in this vicinity.

BETHUNE, GEORGE WASHINGTON, born in New York city, March, 1805, died in Florence, Italy, April 27, 1862. His parents were noted for their Christian charity. He graduated from Dickinson College, Carlisle, Pa., and from the department of theology at Princeton, after which he became a Presbyterian minister. In 1826 he was chaplain to the seamen of Savannah; from 1826 to 1830 pastor of the Reformed Dutch Church at Rhinebeck, N.Y.; from 1830 to 1834 pastor in Utica, N. Y.; from 1834 to 1848 pastor at Philadelphia, Pa.; from 1848 to 1859 pastor in Brooklyn. Failing health compelled him to visit Europe, where he sometimes preached in the only Protestant church of Rome. A short pastorate in New York was followed by a visit to Florence, Italy, where he died. Dr. Bethune was a well-read student of English literature, a writer of merit, and an orator and man of influence in his times.

BÉTON, or BÉTON AGGLOMÉRÉ, a kind of concrete used in the construction of submarine works and other buildings. See Britannica, Vol. VI, p. 243; see also under BUILDING, Britannica, Vol. IV, pp. 456-57; and under BRIDGES, Vol. IV, p. 324, *et seq.*

BETONY (STACHYS BETONICA), a common European labiate plant, growing in woods. It was of great repute in ancient and mediæval medicine; and is sometimes used to dye wool, producing a dark-yellow color.

BETTIA, a municipal town in the northwest of Behar, India, on the line of the Tirhut state railway. Population 21,263, of whom 13,943 are Hindus.

BETTING. See Britannica, Vol. III, pp. 618-19. In the United States, the legislative enactments of the various individual States, proceeding upon the basis of the common law, declare betting to be an indictable offense. Gambling houses are held, on various grounds, to be illegal; and the collection of a bet cannot be enforced by law. A note payable upon receipt of election returns is void in Illinois, Indiana, Iowa, Connecticut, Delaware and Maryland. A bet on a horse race is void in Pennsylvania and New York. All bets are declared void by the laws of Texas and California. In many of the States a stakeholder may be compelled to refund money to the loser which he has already paid to the winner of a bet. Indorsements upon paper which has been given as payment of a bet, though the paper may have passed into the hands of an innocent party, are void in Illinois. Where no such laws exist, the decisions of the courts are, as a rule, adverse to all forms of betting.

BETTOLA, a town of Italy, in the duchy of Parma, about 20 miles southeast of Piacenza. It is situated on the Nure, in a fertile but only partially cultivated district. Population, 6,000.

**BETTS, SAMUEL ROSSITER**, born at Richmond, Mass., June 8, 1787, died Nov. 2, 1868. He graduated at Williams College in 1806, and practiced law in Sullivan county, New York. He was called one of the ablest American jurists. He served in the war of 1812, became judge advocate, sat in Congress (1815-17), was judge of the circuit court of the State for three years, and from 1826 to 1867 was U. S. district judge. He was among the first to formulate maritime laws for the United States, and his decisions in this department and in that of patents, of national and international rights, have been uniformly upheld. He published a work on admiralty practice.

**BETTYS-Y-COED**, a village in Carnarvonshire, North Wales, situated at the point where the Conway receives the Llugwy, 15 miles south of Llandudno Junction, by rail. It is remarkable for the beauty of its location.

**BEUGNOT, ARTHUR AUGUST, COUNT DE**, a French statesman and author, born at Bar-sur-Aube in 1797, died in 1865. In 1841 he was made a peer of France, and was a member of the legislative assembly in 1849. His most important writings related to Judaism, to the overthrow of western paganism, and to the institutions of Saint Louis.

**BEURMANN, FRIEDRICH, COUNT VON** (1835-63), a German explorer. In 1861 he explored the country of the Bogos, and then set out in search of Vogel, who was supposed to have been murdered in Wadai. After many unsuccessful attempts he reached Wadai, where he was murdered by the natives.

**BEUST, VON, FREDERICK FERDINAND FREIHERR**, (1809-86), a German statesman, and one of the most distinguished modern politicians. He represented his government at Munich in 1838, and eight years later he went to London in the same character, whence he was removed to Berlin in 1848; the year following he was called to Dresden, where he received the portfolio of foreign affairs, and a few years later he became minister of the interior. See *Britannica*, Vol. XXI, p. 356. When Frederick VII of Denmark died (1863), Beust came forward prominently as the exponent of the German national feeling on the Schleswig-Holstein question. He was always the friend of Austria, and in the crisis of 1866 he supported her, joining in the declaration of war against Prussia, contrary to the wishes of at least the liberal party in Saxony. When the "six weeks' war" ended he resigned his office by demand of Prussia, and entering the service of Austria he rose to the head of affairs. See *Britannica*, Vol. III, p. 141. The chief result of his policy in the reorganization of the empire was the reconciliation of Hungary on the footing of its remaining a separate kingdom.

**BEVEL**, an instrument used by artisans for drawing angles and adjusting the inclination of abutting surfaces. It consists of a handle and blade jointed together and capable of being adjusted so as to include any desired angle.

**BEVELAND, NORTH AND SOUTH**, two islands in the estuary of the Scheldt, Holland, separated by a channel on the west from the island of Walcheren. The estimated area is about 120 square miles, with a population of about 23,000. Both islands have suffered dreadfully from inundations, but within recent years much good has been effected by drainage.

**BEVEREN**, a town of Belgium, in East Flanders. The principal industry is the making of point-lace. Population, 8,000.

**BEVERIDGE, WILLIAM**, bishop of St. Asaph, born in Barrow in 1638, died in 1708. He was ordained deacon and priest in 1666 after having ob-

tained the degree of M.A. He refused to accept the bishopric of Bath and Wells when Dr. Thomas Ken was deprived of it for his refusal to take the oaths to the government of William III, and was in 1704 appointed to that of St. Asaph. The greater portion of his property was bequeathed to the societies for the Promotion of Christian Knowledge and for the Propagation of the Gospel in Foreign Parts.

**BEVERLAND, ADRIAN**, born in Zeeland about the middle of the 17th century, died in England about 1712. He was a Dutch scholar, whose unorthodox writings on original sin and the fall of man caused much excitement in his day, but are now regarded as mere literary curiosities.

**BEVERLOO**, a village of Belgium in the province of Limbourg, 12 miles northwest of Hessel. On the extensive heaths surrounding it the Belgian army encamps yearly for exercise.

**BEVERLY**, a manufacturing town and summer resort of New Jersey, pleasantly situated on the Delaware River, fifteen miles above Philadelphia. The principal manufactures are woollens, oil-cloth and rope.

**BEVERLY**, a city of Essex county, Mass., in Beverly township, on a bay or inlet of the Atlantic and on the Boston and Maine (Eastern) Railroad, 18 miles northeast of Boston, two miles north-northeast of Salem, at the junction of the Gloucester Branch, (Cape Ann). It is separated from Salem by an inlet of the sea which is crossed by a bridge. It has a good harbor, fine streets and avenues lighted by gas and electricity, extensive shoe and leather manufactories, steam grain elevators, machine and wood-working shops, oil-cloth and enamel works, steam printing establishments, a national and a savings bank, the Beverly cooperative bank, excellent hotels, an efficient police, a well-organized fire department, the New England Institute for the Deaf and Dumb, graded schools, a high school, a public library of 10,000 volumes, and a board of trade composed of 100 business men. Many of the inhabitants are employed in navigation and the fisheries. Valuation of real and personal estate, \$15,000,000. Beverly was incorporated in 1668, and has recently become a city. Population in 1890, 10,795. See *Britannica*, Vol. III, p. 621.

**BEVERWYK**, a town of Netherlands, North Holland, seven miles north of Haarlem. It is situated in the midst of what might be described as a beautiful meadow and is quite a model of Dutch neatness and cleanliness. Population, 2,356.

**BEVIS OF HAMPTON**, the hero of a popular English mediæval romance edited by Dr. E. Kölbing for the Early English Text Society, in 1885. See *ROMANCE*, *Britannica*, Vol. XX, p. 655.

**BEX**, a village in the Swiss canton of Vaud, situated on the high road to the Simplon, about 26 miles southeast of Lausanne. It is remarkable for its extensive salt mines, salt works, and sulphur baths. The quantity of salt annually produced at Bex is between 2,000 and 3,000 tons. Population, 3,000.

**BEYERLAND**, an island of South Holland, formed by the junction of the Old Maas with Holland Diep on the one side, the river Spui uniting the Old Maas with the Haringvliet on the other. It is a thriving place, of nearly 4,000 inhabitants.

**BEY**, a Turkish title. See *Beg*, in these Revisions and Additions.

**BEYPUR**, a seaport of Western India, in Malabar district, Madras, situated near the mouth of the Beypur River, six miles south of Calicut. Iron ore and coal are found in the neighborhood, and iron works have been established here. Since 1858 Beypur has acquired importance as the terminus of



a railway across the peninsula of India from Madras by way of Coimbatore. Population, 7,000.

BEZANT, or BYSANT, properly the *solidus*, a coin of the Byzantine empire which had a wide circulation in Europe during the period from about A. D. 800 to the middle of the 13th century. The gold bezant varied in value at different periods from a sovereign to half a sovereign; the silver one from a florin to a shilling. In architecture, small round disks ornamenting a molding, and in heraldry "roundels" on a shield, showing descent from a crusader.

BEZDAU, a market town in the Hungarian province of Baes, situated on the canal which joins the Theiss and the Danube. Population, 8,000.

BEZOAR, a concretion found in the stomachs of goats and antelopes, and formerly much valued on account of imaginary medicinal virtues, particularly as an antidote to poisons.

BHAGAVAD-GITA (that is, Revelations from the Deity), the title of a religious metaphysical poem, interwoven as an episode in the great Indian epic poem of the Mahābhārata.

BHAGIRATHI, the name of two rivers of India, one of which is a principal head-stream of the Ganges, and the other an affluent of the Ganges, known in its lower course as the Hoogly.

BHANPOORA, a walled town of Indore, Central India. It is situated on the Rewah, and contains a fort and a palace of the Mahratta ruler, known as the Holkar.

BHARTRIHARI, the name of a celebrated Indian writer of apothegms. Very little is known of his life. A legend makes him the brother of King Vikramāditya, who lived in the first century before Christ, and relates that after a wild, licentious youth he betook himself in later years to an ascetic life. Cheerful descriptions of Nature and charming pictures of love alternate in these apothegms, with wise remarks upon the relations of life, and profound thoughts upon the Deity and the immortality of the soul. Bhartrihari is the first Indian author known in Europe; two hundred of his apothegms were translated in 1653 by Abraham Roger, published under the quaint title, *Open Gates to Hidden Heathenism*. Bohn published an excellent and successful metrical translation in German (Hamburg) in 1835.

BHAVANI-KUDAR, a town in the presidency of Madras in the district of Coimbatore, 58 miles from the city of that name, at the confluence of the Bhavani and the Cavery rivers.

BHOOL, the capital of Cutch, in India, situated at the foot of a fortified hill of the same name, where a temple has been erected to the Cobra da Capella. Its mosques and pagodas, interspersed with plantations of dates, give to the town an imposing appearance from a distance. In 1819 it suffered severely from an earthquake. It is celebrated for its manufactures in gold and silver. Population, 20,000.

BHOWAN, BHOWANJ, BHEWANNEE, or BHIWANI, a town in the district of Hissar, Punjab, British India.

BHUJI, or BUJ, a small hill state extending along the left bank of the Sutlej, in India, for about twenty miles. Its greatest breadth is about seven miles.

BHUTAN, an independent state in the Eastern Himalayas, on the northeast of Tibet. Area, 16,800 square miles. Population, 35,000. Capital, Punakha. For early history, see *Britannica*, Vol. III, p. 631.

Since 1845 the Indian government bestows on the Bhutan rulers an annual subsidy of 50,000 Rs., and in return is permitted to hold two strong fortresses (Buxa and Dewangiri) as a protection from warlike

incursions. The state is 160 miles in extreme length east and west and 90 miles in extreme breadth.

The government of Bhutan resembles that of Tibet, the chief authority being nominally divided between the *deb raja*, or secular head, on the one hand, and the *dharma raja* or spiritual head of the state on the other. Practically, the *deb raja* is a mere instrument in the hands of powerful barons. The *dharma raja* is supposed to be the incarnation of his predecessor, and is chosen in infancy. The chief towns of Bhutan are: Punakha, the capital, a place of great natural strength, Tashichhu Jong, Paro, Angdiphorang, Tongsa, Tarka, and Biaka.

The people are nominally Buddhists, but their religious exercises consist chiefly in the propitiation of evil spirits and the recitation of sentences from the Tibetan Scriptures. Tashichhu Jong, the chief monastery in Bhutan, contains 300 priests.

The chief productions of Bhutan are rice, Indian corn, millet, two kinds of cloth, musk, ponies, chowries, and silk. Muzzle-loading guns and swords of highly-tempered steel are manufactured.

The trade between British India and Bhutan amounted in 1888-89 to 153,000 Rs. imports from and 252,000 Rs. exports to India. The chief imports are tobacco, European cotton goods, betel-nuts and rice; the chief exports, wool, musk, ponies, and caoutchouc.

BIALYSTOK, a fortified town in the government of Grodno, Russia. It carries on various manufactures, among them woollens, hats, leather, soap, and tallow.

BIANCAVILLA, a town of Sicily, 14 miles northwest of Catania, and 10 miles from Mount Ætna, with a trade in grain, cotton, and silk. Population, 9,000.

BIANCONI, CHARLES (1786-1875), inventor of the Irish car system, born in Lombardy in 1786, and came at the beginning of the century to Ireland as an itinerant vendor of cheap prints. He accumulated a small capital, and, recognizing the need of public conveyance in Ireland, he started the first car between Clonmel and Cahir in 1815, at a time when peace and the carriage-tax had filled the market with cheap horses and jaunting-cars. The enterprise proving a success, the system was extended, until, 40 years later, Bianconi's cars were working over 4,000 miles of road daily. Having realized a large fortune, he retired in 1865, and died in September, 1875, at his estate near Cashel.

BIARD, AUGUSTE FRANÇOIS, a French painter, born at Lyons in 1800, died in 1882. He was at first destined for the church, but was educated at the school of art in his native city. He is distinguished for his animated and often comical representation of ordinary life and manners, but is known in almost every department of his art.

BIBERICH, a village in the duchy of Nassau, on the right bank of the Rhine, about four miles south from Wiesbaden. It is noted for its splendid palace. The views of the river scenery from Biberich are unrivaled. Population, including Mosebath, 6,700.

BIBLICAL ARCHÆOLOGY. Early in 1890 Dr. John Fraser, of New South Wales, read before the Victoria Institute a highly interesting paper entitled *The Aborigines of Australia; Their Ethnic Position and Relations*. He presented a strong argument in refutation of the position taken up by Lenormant and others, who would cut off the Australians from the record in the tenth chapter of Genesis, and, by consequence, from all connections with the sons of Noah. Dr. Fraser identifies the dark race spoken of in the cuneiform inscriptions, as existing in the plains of Babylonia, with the Kushites; whose empire and whose people once

extended "from the Mediterranean to the Ganges, and from the Indian Ocean northwards to the plateau of Ararat. Other races, however, came down upon them from Central Asia, and, like a wedge, split them in two. Hence the position of this race is, in Genesis x, indicated ethnically by the names of Cush and Mizriam, and Phut and Canaan, which are the countries geographically called Ethiopia and Egypt and Nubia and Palestine. Their dominion had thus been thrown much to the west of their original seats, and had lodged itself in Africa, near the stronghold of the western Kushites," whose eastern brethren, after migrations and adventures which had led them "through the mountain passes into the tableland of the Punjab, and thence into the Gangetic plains," were "pushed," by Aryan invaders from the northwest, "down the Ganges into Farther India and the Malayan Peninsula; thence to pass at a later time into Borneo and the Sunda Islands and Papua; and afterwards across the Sea of Timor into Australia, or eastwards into Melanesia, driven onwards now by the Turanian tribes who had come down from Central Asia into China and the peninsula and the islands of the East Indies." Dr. Fraser fortifies his position with arguments and illustrations of various kinds—linguistic, ethnological, and religious.

Two other papers worthy of special note in this article were read before the same institution during the year 1890: One (Jan. 20, 1890) by James Neil, M.A., bearing the descriptive title of *Land Tenure in Ancient Times, as Preserved by the Present Village Communities in Palestine*; and the other, read by Mr. Hormuzd Rassam, June 23, discussed *The Garden of Eden and Biblical Sagas*. Mr. Rassam examined, to reject, the views of scholars who would localize the cradle of mankind in various places "from Scandinavia to the South Sea Islands, from China to the Canary Isles, and from the Mountains of the Moon to the coasts of the Baltic." He claimed that the arguments put forth in the brochure, *Wo lag das Paradies?* by Prof. Friedrich Delitzsch, the latest

supporter of the Babylonian theory, were "quite untenable when compared with the plain words of Holy Writ." Mr. Rassam's contention was "that the only part of the world that could be assigned for the ancient site of the Garden of Eden would be the country that surrounds Lake Wan (or Van) in Armenia." It should be noted, however, that Mr. Rassam probably had not read the books of President W. F. Warren, LL.D., of Boston University, entitled *Paradise Found; The Cradle of the Human Race at the North Pole*, as he makes no allusion to the ingeniously elaborated argument presented in that volume.

Dr. Edward Taylor, F.R.S., in discussing, at one of the society's meetings in 1890, *The Winged Figures of the Assyrian and Other Ancient Monuments*, is reported to have adopted and enforced with great emphasis the striking point of comparison, noticed many years ago by Sir H. Layard, of the Assyrian sculptures with the mystic vision of the prophet Ezekiel. The Chevalier Ernest de Bunsen, whose reputation is intimately connected with the subject of Biblical chronology, contributed a paper on *The Pharaohs of Moses According to Hebrew and Egyptian Chronology* to the February meeting of the society; to the June meeting of which a paper was submitted and read in abstract—appearing afterwards at length, and in the original French in the *Proceedings* of the society—*Sur les Dynasties Divines de l'Ancienne Egypte*, by Professor G. Maspero. It is conversant about the origin, the constitution, and the distribution of the divine dynasties, which, according to tradition, had preceded the human dynasties in Egypt, and whose record had furnished the basis of diverse hypotheses on the past on the part of students of Egyptian history and chronology. M. Maspero accepts the solution of the question proposed thirty years ago by Lepsius, in his *Mémoire sur le Premier Cycle des Dieux Egyptiens*, as being in the main true.

**BIBLE CHRISTIANS.** See RELIGIOUS DENOMINATIONS in the United States, in these Revisions and Additions.

**BIBLE CIRCULATION.** For the general discussion of questions relating to the Bible and its circulation by various organizations to the year 1875, see *Britannica*, Vol. III, 634-650. The annual report of the British and Foreign Bible Society for the year ending March 31, 1890, showed a total issue for that year, by that society, of 3,792,263 copies of Holy Scriptures. This was an increase over the issues of the preceding year of 115,059. The great increase of the work of the British and Foreign Bible Society during the last few years may be seen by the following tabular statement of its total issues by decades:

|                                       |             |
|---------------------------------------|-------------|
| Total issues to March 31, 1820        | 2,843,291   |
| For ten years to March 31, 1830       | 3,710,507   |
| “ “ “ “ 1840                          | 5,768,373   |
| “ “ “ “ 1850                          | 10,787,579  |
| “ “ “ “ 1860                          | 14,417,778  |
| “ “ “ “ 1870                          | 21,868,843  |
| “ “ “ “ 1880                          | 28,771,748  |
| “ “ “ “ 1890                          | 35,760,627  |
| Grand total from date of organization | 123,929,046 |

The receipts for the year ending March 31, 1891, aggregated \$1,060,387; total expenditures for the year, \$1,137,830. Total expenditures from the beginning of the society (86 years), \$54,969,407.

The American Bible Society issued during the year ending March 31, 1890, an aggregate number of 1,496,057 copies; increase over the preceding

year of 55,602. Its total issues from 1816, the date of its organization, to March 31, 1890, aggregated 52,736,075. The cash receipts for the year aggregated \$597,693.

The number of issues of the two societies (British and Foreign and American Bible Societies) during 1890 aggregated 5,288,317 copies, an average of about 17,000 copies of the Scriptures for every working-day of the year. For a full list of the parent Bible societies, with the latest total number of issues reported by each, see **BIBLE SOCIETIES**, in these Revisions and Additions. The grand total of issues to date circulated by all the societies was 217,828,118.

In not a few cases no written language or dialect was found, and the missionary teacher was required to give the people first a language and then the translation of the Bible into it.

The following are specimens of the languages and dialects into which the Bible, or portions of it, had been translated and printed up to the year 1890. The number of languages into which the Bible, or portions of it, were translated, printed, and circulated, directly or indirectly, by the British and Foreign Bible Society and the American Bible Society to that date, was 291. After making due allowance for repetitions, the specimens here given represent 213 languages and dialects. They are arranged very nearly according to the countries in which they originated. The reader begins with the languages of the British Isles, 1 to 6, and proceeds to the Continent of Europe, 7 to 68. The languages



of Asia come next, 69 to 162; then the islands, 163 to 185; then those of Africa, 186 to 217; and, finally, those which are peculiar to the American continent, 218 to 242.

In some cases, as will be noticed, the specimen is repeated to show the different alphabets or characters which the people use. The Turkish version, for example, is prepared for Moslems in the Arabic letter; but for Armenians an entirely different form is needed, and for Greeks yet another. Except where otherwise indicated, the Scripture verse here given is that of John iii: 16.

### 1. ENGLISH.

For God so loved the world, that he gave his only begotten Son, that whosoever believeth in him should not perish, but have everlasting life.

### 2. GAELIC.

(Highlands of Scotland.)

Oir is ann mar sin a ghràdhaich Dia an aoighal, gu'n d'thug e 'aon-ghin Mhic féin, chum as ge b'e neach a chreideas ann, nach sgriosar e, ach gu'm bi a'bheatha shiorruidh aige.

### 3. IRISH.

Óir is mar sin a éirigh Dia an dóthan, go dtug sé a éinígein Mhic féin, chomh maith le h'ádh, chomh maith le h'ádh, chomh maith le h'ádh, chomh maith le h'ádh, chomh maith le h'ádh.

### 4. IRISH (Roman).

Oir is mar sin do ghrádhúigh Dia an domhan, go dtug sé a éinígein Mhic féin, ionnus gídh bé chreideas ann, nach rachadh sé á muga, achd go mbeith an bheatha shiorruidhe aige.

### 5. MANX.

(Isle of Man.)

Son lheid y ghráih shen hug Jee da'n theihll, dy dug eh e ynrycan Vac v'er ny gheddyn, nagh jinnagh quoi-erbee chredjagh aynsyn cherraghtyn, agh yn vea ta dy bragh farraghtyn y chosney.

### 6. WELSH.

Canyis felly y carodd Duw y byd, fel y rhoddodd efe ei unig-anedig Fab, fel na choller pwy bynnag a gredo ynddo ef, ond caffael o hono fywyd tragywyddol.

### 7. BRETON.

(Brittany.)

Rag evel-se eo en deus Doue caret ar bed, ma en deus roed e Vab unik-ganet, evit na vezo ket collet ploubenag a gred ennau, mes ma en devezo ar vuez eternel.

### 8. FRENCH.

Car Dieu a tellement aimé le monde, qu'il a donné son Fils unique, afin que quiconque croit en lui ne périsse point, mais qu'il ait la vie éternelle.

### 9. FRENCH BASQUE. (Pyrrhences.)

Jaincoac ecen hain maite iñan du mundua; non eman baitu bere Seme bakharra, amoreagatic norcere sinhesten baitu hura baitan gal ez dadin, bainan çan deçan bethiereco bicla.

### 10. SPANISH.

Porque de tal manera amó Dios al mundo, que haya dado á su Hijo unigénito; para que todo aquel que en él creyere, no se pierda, mas tenga vida eterna.

### 11. CATALAN. (Eastern Spain.)

Puix Deu ha amat de tal modo al mon, que ha donat son unigenit Fill, á fi de que tot hom que creu en ell no peresca, ans be tinga la vida eterna.

### 12. SPANISH BASQUE.

Alchatuco naiz, eta juango naiz nere aitagana, eta esango diot: Aita, pecatu eguin nuen ceruaren contra, eta zure aurrean.—(Luke xv. 18.)

### 13. SPANISH BASQUE. (Guipuscoan Dialect.)

Joaten ceratela bada eman zayozcatzute eracutsiac jende guciai: batayatzan dituzutela Aitaren, eta Semearen, eta Espiritu santuaren icenean.—(Matt. xxviii. 19.)

### 14. GITANO. (Spanish Gipsies.)

Mangue ardifelaré, y chalaré al batusch, y le penaré: Batu, he querdi crejete contra o Tarpe y anglal de tucue.—(Luke xv. 18.)

### 15. PORTUGUESE.

Porque de tal maneira amou Deos ao mundo, que deo a seu Filho unigenito; para que todo aquelle que nelle crê, não pereça, mas tenha a vida eterna.

### 16. ICELANDIC.

Því svo elskaði Guð heiminn, að hann gaf sinn eingetinn Son, til þess að hver, sem á hann trúir, ekki glatist, heldur hafi eilíft líf.

### 17. NORWEGIAN.

Þíi sáa háber Guð eistit Verðen, at han háber gívet sín Son den enbaarne, þaa det at hver den, som tror pá honom, skál lifte förgað, utan fá evinnerligit líf.

### 18. SWEDISH.

Þíi sá álsfáde Guð verðena, att han utgaf sín enba Son, pá det att hvar och en, som tror pá honom, skál lifte förgað, utan fá evinnerligit líf.

### 19. NORWAY-LAPPONESE (or Quanian).

Dastgo nuft rakkasen ani Ibmel mailme, atte barnes sún addi, dam alno, amas juokkañ, gutte su ala áasko, lapput, mutto vai agalañ tellem sún ážusi.





#### 41. VAUDOIS.

(Waldenses,  
N. Italy.)

Perqué Diou ha tant vourgù bén ar mount, qu'a l ha dounè so Fill unic, perque quicounqué cré en el perissè pâ, mà qu'a l abbia la vita éternella.

## 42. MALTESE.

Ghallex Alla hecca hab id dinia illi ta l'Iben  
tighu unigenitu, sablex collm'n jemmen bih  
ma jintilifx, izda icollu il haja ta dejem.

### 43. GREEK (Ancient).

Οὕτω γὰρ ἡγάπησεν ὁ Θεὸς τὸν κόσμον,  
ἵνα τὸν υἱὸν αὐτοῦ τὸν μονογενῆ ἔδωκεν, ἵνα  
πᾶς ὁ πιστεύων εἰς αὐτὸν μὴ ἀπόληται, ἀλλ'  
ἔσται ζωὴν αἰώνιον.

#### 44. GREEK (Modern).

Διότι τὸσον ἠγάπησεν ὁ Θεὸς τὸν κόσμον,  
ὥστε ἔδωκε τὸν Υἱὸν αὐτοῦ τὸν μονογενῆ, διὰ  
να μὴ ἀπολεσθῇ πᾶς ὁ πιστεύων εἰς αὐτόν,  
ἀλλὰ να ἔχῃ ζωὴν αἰώνιον.

45. GREEK (Modern) (Roman).

Sicothis thelo ipaghi pros ton patera mu, ke thelo ipi pros afton, Pater, imarton is ton uranon ke enopion su.—(*Luke xv. 18.*)

#### 46. ALBANIAN (Gheg).

Sepeş Perendia kaki e deşti botçene, sâ şa  
Brin' e vet, vetem-l'şmine, pîr mos me uvdierş  
gîşç-kuş t'i besoye, por te ketş yetş te pa-  
eşeme.

## 47. ALBANIAN (Tosk).

Σὲ ψὲ Περντία κύκε εἰ δέοι πότνε, σὰ  
 καὶ δὰ τὲ πῖρβ' ἐτίγ τὲ βέτεμνε, καὶ τζίλι  
 δο καὶ τὲ πσοόγνε ντὲ αἰ τὲ μὸς χουμπάσε,  
 πὸ τὲ κέτρε γέτεν' εἰ πα σόσουρε.

48. TURKISH (*Arabic*).

زیرا الله دنیاى بو قدر سودی که  
کدی ابن وحیدنی ویدی تا که اکا  
هر ایماز ایدن هلاک اولیوب ایجق حیات  
ایده به مالک اوله.

49. TURKISH (*Greek*).

Ζίρα Ἀλλὰχ τὴνγιαγιά πὺν κατὰρ αεβί  
κι, κεντὶ πιριτζίκ 'Ογλουρὺν βερτὶ, τάκι χερ  
ὄνα ἱνανὰν, ζαὶ ὀλμαγια, ἴλλα ἐπέτι χαιατὰ  
μαλικ ὀλά.

### 50. TURKISH (*Armenian*).

Օգրա Վլադ տիւնեայր պու դատար օգլտի քի  
քեռտի լալի ի վահտիտի վերտի, Թա քի անա հեր իման  
էտէն հէլաք օլմայլայր, անճադ հայաթ Ը էպէտիկէյէ մալիք  
օլա :

51. SPANISH (Hebrew). (Spanish Jews in Turkey.)

פורקי אנסי אמו איל דייו אה איל מונדו אסטט דאר  
אה סו איתו ריגאלדו פארה קי טוודו איל קי קריאי  
אין איל נו מי דיפיידרה סינו קי טינגה צידה די  
סיימפרי.

52. ROUMAN (*Roman*).

(Danubian  
Prov.)

Caci așa a iubit Dumnezeu lumea, încat a dat pre Fiul sau cel unul-născut, ca tot cel ce crede în el și nu se pierde, ci și aiba viața eternă.

## 53. ROUMAN (Cyril character).

Къѣ аша а ізвѣст Дѣмнезоѣ ахмоса, къ а дат не Філіѣ  
сѣѣ чол зпѣлѣскѣт, ка тот чол че крѣдо ꙗ са сѣ не  
неарѣ, ꙗ сѣ аѣѣ вѣіаѣѣ вѣчнѣѣ.

54. RUTHENIAN. (*Little Russia.*)

ВСТАВИШИ НЇЇСЬ ДО ОЇЦЬ МОЇЄГО, І  
ЗКАЖЕ ІЄМУ: ОУЧЕ, ЗГРІШИВ ІЄМ ПРОТІВ  
НЕБА І ПЕРЕД ТБЄЮ.—(Luke xv. 18.)

55. SERVIAN.

Јер Богу тако омиље свијет да је и  
сипа својега јединороднога дао, да ни  
један који га вјерује не погине, него  
да има живот вјечни.

## 56. CROATIAN.

Jer Bogu tako omilje svijet da je i sina  
svojega jedinorodnoga dao, da ni jedan koji  
ga vjeruje ne pogine, nego da ima život vječni.

## 57. BULGARIAN.

Защото Богъ толкозь възлюби свѣтъ-  
тъ, щото даде Сына своего еднородна-  
го, за да не погыне всякой който вѣру-  
ва въ него, но да има животъ вѣченъ.

## 58. SLAVONIC.

ТАКЪ ВО ВОЗМОЖИ БГЪ МІРЪ, ІЖЪ  
И СНА СВОЕГО ЕДИНОРОДАГО ДАЛЪ ЕСТЬ,  
ДА ВСАКЪ ВЪРЪАИ ВЪ СНЬ, НЕ ПОГІБ-  
НЕТЪ, НО ІМАТЬ ЖИВОТЪ ВЪЧНЫЙ.

## 59. RUSSIAN.

Ибо такъ возлюбилъ Богъ міръ, что  
отдалъ Сына своего единороднаго, дабы  
всякій, вѣрующій въ Него, не погибъ, но  
имѣлъ жизнь вѣчную.

## 60. ESTHONIAN (Reval). (Russia.)

Seft nenda on Jummal ma-ilma armastanud, et  
temma omma aino sünninud Poia on annud, et ühtki,  
kes temma sisse ussub, ei pea hukka sama, waib, et igga-  
sennpe ello temmal peab olla.

## 61. ESTHONIAN (Dorpat).

Seft nida om Jummal sebbä ilma armastanu, et  
temma omma aino sünninu Poiga om andnu, et kiki,  
kea temma sisse uskwa, hukka ei sa, enge iggawest ello  
salwa.

## 62. LETTISH. (Livonia.)

Un tik lohti Dievds to pasauli mihstēds, ka wisch  
sawu paschu wenupredsinuschu Deslu irr dewds, ka  
wissem teem, kas tik eefsch winna ne buhs pasfsted,  
bet to mufschigu bshiwofchunu dabuht.

## 63. KARELIAN. (Finland.)

Нійнъ ана валгуовъ шійнъ валгіё  
ишегмизіёнъ іёшши, ю ана няхняйсь  
шійнъ гювяшъ азіёшъ: и кійшъшшайсь  
шійнъ Туайшубъ, кумбане онъ шайвага-  
шша.—(Matt. v. 16.)

## 64. ZIRIAN, or Siryenan. (Finns about Vologda.)

Сыдзи медъ югъаласъ тіанъ югы-  
дъ мортъасъ водзинъ, медъ адъасны  
тіаналъсь егръ керомъасъ, и ошка-  
сны батесъ тіаналъсь, коды неке-  
саасъ вылынъ.—(Matt. v. 16.)

## 65. SAMOQITIAN. (Wana.)

Wesa taipu Dievas numitējo swleta, jog Sunu sawu  
dālungimusi dāwe: idānt hētwienas, turs ing ji tik, ne  
pražutu, bet turētu amžina glwāta.

## 66. MORDVIN.

Сёксъ исшй вѣчкизе Пазъ масшбронъ  
эрицяшъ, мѣксъ мѣксызе цюранзо сонзё  
скѣмонъ шѣчшуманъ, шшобъ эрвѣ кѣмиця  
лангозонзо авбъ юма, но љлевель пѣн-  
гень эрѣмосо.

## 67. TCHEREMISSIAN. (Finns on the Volga.)

Теньгё ярашёнъ Юма сандѣликамъ,  
шшѣ йкъ шкё эргажамъ пұшъ, сѣкай  
инѣнъша шѣдаланъ инже-ѣмъ, а йлеже  
варѣ мучѣшдѣма кұрумъ мұчка.

## 68. TCHUWASH. (Volga.)

Сяплѣ іорѣдрѣ Тора Эдема, што барзѣ  
ху љвылне пѣрь сѣрѣдныне, штобы поръ  
инѣнягтѣнъ она анъ пѣодтаръ, а ѣсрѣдаръ  
іѣмюрѣгъ бұрназя.

## 69. WOTJAK. (W. Siberia.)

Озй медъ пиштѣзъ югытъ-тѣ тилѣдъ  
адѣмийѣдъсѣзинъ, собъ медъ адзіѣзъ  
дзѣць уждѣсь тилѣдъ, сѣ-но медъ сѣѣтозы  
Анлѣ, кудѣзъ инъ вылынъ.—(Matt. v. 16.)

## 70. WOQUL. (Ural Mountains.)

Ти-саувт Тѣрим ѣрентистѣ мерма сто  
еле-мистѣ ѣкутѣлим пувта, исто сокин-  
кар, кон агтта тѣве, ат пи колни, а инра  
лилма контитѣ.

## 71. ORENBURG, or Kirghise Tartar.

زنگه خدا جهانى اول قدر سويدي كه بر دوعمش ارغلىن يردى  
كه هر كيم آنك ارشاشا هلاى يولماي لكن ابدى حياتي يولا .

## 72. OSSETIAN. (Caucasia.)

Цæмæджæрдтæр Худæ æрæ бауарста дугей, æмæ  
Jæ jūdægγurд Фæрæдæр радта умæн, дæмæж Jj jæj  
урна, Jj ма фесæвæ, фæлæ in Jæ æнJсæн пард.

## 73. HEBREW.

כי כה אהב אלהים את־העולם כי־תתן את־  
בנו היחיד למען כל־הבאמן בו לא יאבד  
כי אסחיי עולם יהיו לו :









102. SINDHI (Arabic). (Western India.)

چا کان د خدای جهان کی ایترو پیارو رکبو  
جو پہنچو ھکڑوی جیل پت دنا د  
جیکو کو تنہ تی وپسہ آپی سو چت  
نئی و پتر ہمیشہ جسٹ لہی

103. SINDHI (Gurumukhi).

ਭਾ. ਖੀ ਤਈਸਰ ਜਗਤ ਖੇ ਇਹਨੇ ਪਿਆਰੇ ਰਖੇ ਜੇ ਪਰਜੇ  
ਹਿਰਿਜੇ ਈ ਜਲਾਲ ਪੁਤ ਭਿਨਾਈ ਤ ਜੇਰੇ ਕੇ ਤਨਿ ਤੇ ਫੇਸਾਰ  
ਆਇ ਜੇ ਨਾਸੁ ਨ ਬਿਏ ਫੇਤਰਿ ਸਦਾ ਜਿਅਲੁ ਲਹੇ ॥

104. MOULTAN, or Wuch, or Ooch.

ਅਮਰਾ ६੪੨੦ ੨੨੦੨੦ ੪੬ ੨੬੪੨੨ ੨੩ ੨੦ ੪੨੨੦  
੪੪੪ ੨੨੪੨੨ ੪੨੨੦ ੪੨ ੨੬ ੨੦ ੨੩੨੨ ੪੨੨੦ ੪੬  
੬੩ ੨੬੩੨ ੨੨੨੨ ੪੬ ੨੨ ੨੨੨੨ ੨੬੨੨ ੨੬੨੨ ੪੬੨

105. PUNJABI, or Sikh.

ਕਿਉਕਿ ਪਰਮੇਸਰ ਨੈ ਜਗਤ ਨੂੰ ਅਜਿਹਾ  
ਪਿਆਰ ਕੀਤਾ, ਜੇਉਸ ਨੈ ਆਪਲ  
ਇਕਲੋਤਾ ਪੁਤ੍ਰ ਦਿਤਾ; ਤਾਂ ਹਰੇਕ ਜੇ ਉਸ  
ਪਰ ਪਰੀਤ, ਤਿਸ ਨਾ ਨਾਮ ਨਾ ਚੰਦੇ, ਸਗਲਾਂ  
ਸਦੀਪਕ ਜੀਉਲ ਪਾਵੇ ।

106. GONDI. (Central India.)

ਯਾਹੁ ਜੀਸਾ ਚਲਾਏ ਯਾਹੁਜੀਨਾ ਸੁਭੇ ਬਸਥੇ ਯਾਹੀ ਫਿਰ  
ਕਿ ਯੋਥੇ ਜੀਸਾ ਯਹੋ ਯਾਹੁਜਾ ਫੁਲੀਯਾ ਜੀਸੇਰ ਯਾਹੀਯਾ ਯਾਹੁਜਾ  
ਗੁਯਾਨੁਯਾਦ ਜੀਰ ॥ (Matt. v. 16.)

107. NEPALESE, or Parbutti.

ਯਾਹਾ ਫਿਰਲੇ ਫੁਨਿਯਾਲਾਏ ਏਥੋਂ ਪਿਥਾਰੇ ਗਯਾ ਕਿ ਚਲਲ ਯਾਹੁਜਾ  
ਯਾਹੁਜਾ ਯਾਹੁਜਾ ਦਿਯੋ ਕਿ ਜੋ ਫੇਰੇਕ ਜਾਨਿਯ ਯਾਹੁਜਾ ਪਿਥਾਰ  
ਯਾਹੁਜਾ ਯੋ ਯਾਹੁ ਜ ਫੇਰੇਕ ਹਰ ਯਾਹੁਜਾਯਾਯਾ ਪਾਯਨ ।

108. TELUGU. (S. E. India.)

ਯੋਮੁਕੁੰਦੇ ਦੇਵਰੁ ਰੋਮੁ ਪ੍ਰੇਮਿਯੁ  
ਯੋਮੁਕੁੰਦੇ—ਯੁਮੁ ਯੰਦੁ ਵਿਰਾਜਮੁ  
ਪ੍ਰੇਮਿਯੁ ਨੀਰਵਕ ਨਿਰਯੁਜਮੁ ਯੋਮੁਕੁੰਦੇ  
ਯੁਮੁ ਯੰਦੁ ਜਨਿਯੁਕੁ ਯੁਮੁਕੁੰਦੇ ਯੁਮੁਕੁੰਦੇ

109. CANARESE. (Mysore.)

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਵਿਰਾਜਮੁ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ, ਨਿਰਯੁ ਜਨਿਯੁ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

110. SINGHALESE. (Ceylon.)

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

111. PALI.

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

112. TAMIL.

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

113. DAKHANI, or Madras Hindustani.

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

114. MALAYALAM. (Travancore.)

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

115. TULU. (W. of the Mysore.)

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

116. MARATHI. (Western India.)

ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ  
ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ ਯੋਮੁਕੁੰਦੇ

117. MARATHI (Modi).

ਮੰਤਰ ਚੇਨੇ ਸ਼ਾਪਰ ਭੇਪੰਡੀ ਸ਼ੀਨੀ ਸ਼੍ਰੇ ਸ਼ੀ, ਲਸੇ  
ਪੁਰਸ਼ ਭੇਪੰਡੀ ਪੁਤ ਭੀਸ਼, ਮਾਗੀ ਸ਼ੀ ਸ਼ੇ  
ਸ਼ੇਨੀ ਲਸਪਰ ਪੀਸਾਭ ਭੇਪੰਡੀ ਲਸਚ ਸ਼ਾ  
ਚੇਭੰ ਨਭੇ, ਪਰ ਲਸਚ ਭੇਪੰਡੀ ਸ਼ੀਪਰ ਭੇਪੰ.

118. GUJERATI.

ਕੇਮੇ ਦੇਵੇ ਅਮਰ ਪਰ ਅੰਗੇਸ਼ ਪੀਤਿ ਤਿਖੀ, &  
ਤੇਭੇ ਪੋਤਾਨੇ ਅੰਗੇਸ਼ੀਅਤਿ ਪੁਤ ਅੇ ਸ਼ਾਤ੍ਰ ਅਾਭੇ।  
ਕੇ, ਨੇ ਕੇਭ ਤੇ ਪਰ ਵਿਖੇਸ਼ ਕੇ ਤੇਨੇ ਨਾਥ ਅ  
ਥਾਭੇ, ਪਭੇ ਅਮਰ ਅੰਗੇਸ਼ ਪਾਭੇ.

119. PARSİ-GUJERATI.

ਕੇਮੇ ਅੇਦਾਭੇ ਦੁਨੀਆ ਪਰ ਅੰਗੇਸ਼ ਪੀਅਰ ਤਿਖੀ  
ਕੇ ਤੇਭੇ ਪੋਤਾਨੇ ਅੰਗੇਸ਼ੀਅਤਿ ਭੇਪੰਡੀ ਅੇ  
ਨਾਥਤੇ ਅਾਪੀਅੇ ਕੇ, ਨੇ ਕੇਭ ਤੇਨੇ ਭਪਰ  
ਅੇਤਕਾਦ ਲਾਭੇ ਤੇਭਲਾਕ ਅ ਥਾਭੇ, ਪਭੇ ਭੁਭੇਰੀਨੀ  
ਭੰਗਲੀ ਪਾਭੇ.

120. INDO-PORTUGUESE. (Colonies in Ceylon.)

Parqui aasi Deos ja ama o mundo, qui elle  
ja da sua só gerado Filho, qui quemseja lo crê  
ne elle nada ser perdido senão qui lo acha vida  
eterno.

121. ASSAMESE.

ਪਿਰ ਮਾਂਤਰ ਪ੍ਰਭੂ ਵਿਸ਼ਨੁ ਕਰ ਜੇਹੇ ਸਿਰਿਨਾਥੁ ਸਰਸਾਥੁ ਨ ਹਰ  
ਕਿਭ ਅਨਭ ਆਪ੍ਰੇ ਹਮ ਏਹੇ ਕਾਥਾ ਪ੍ਰਭੂ ਆਸ਼ਿਨ ਅਜਿਤੀਭ  
ਭਾਤ ਅੰਥਕ ਸਿਨੇ ਭੈਭ ਏਹੇ ਕਰਨ ਅੰਗਭੇ ਚੇਨੇ ਕਥਿਨ।

122. KHASSI (Eastern India.)

Naba kumta U Blei u la feit ia ka pyrtel,  
katba u la aitti-noh ia la U Khun ia u ba-la-  
kha-marwei, ba uei-uei-ruh u bangeit ha u, u'n  
'nu'm jot shuh, hinrel u'n ioh ka jingim  
b'ymjiukut.

123. SIAMESE.

ကံပံသာမာဒောကံဂါတာဒ် ကံပံဂါတာဒ်, ဟံဂါ

ပာဒောကံ ပုကာဝကံဂါတာဒ် အာဒောကံ, ဟံဂါတာဒ်  
ဟံဂါတာဒ်, ဟံဂါတာဒ်, ဟံဂါတာဒ်, ဟံဂါတာဒ်, ဟံဂါတာဒ်

124. PEQUESE. (Burmah.)

ਭੇਰੇਤਰੁਭੇਲੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:

(Gal. v. 1.)

125. BURMAN.

ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:

126. KAREN. (Burmah.)

ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:

127. BGHAI-KAREN.

ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:

(1 John i. 3.)

128. SGAU-KAREN.

ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:

(1 John i. 3.)

129. PWO-KAREN.

ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:  
ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ: ਭੇਰੇ: ਪ੍ਰਿਭੇ:

(Matt. v. 16.)



### 130. TIBETAN.

དཀོན་མཆོག་གིས་ཉིད་ཀྱི་སྤྱི་གཅིག་  
 བོ་བྱེན་པ་ཙམ་དུ་འཇིག་རྟེན་ལ་བྱམས་  
 བ་མཛད་པས། དེ་ལོ་དད་པ་ཐམས་ཅད་  
 ཞིག་པར་མི་གྲུབ་ཀྱི། མཐའ་མེད་པའི་  
 སྤྱིག་ཐོབ་པར་བྱའོ།།

## 131. MALAY.

کړنا لږمليکن څړېښ الله سرده مټاسيېې اېسي دنيا  
سېښټ گړنياکن انقن پڅ توغښکل سغلي بارغسيښه  
پڅ څړچلي اکن دي تياک اکن بناس هان منداقت  
کېدوږن پڅ کلل .

132. MALAY (*Roman*).

Kerna demikianlah halnya Allah tūlah munga-  
sihi orang isi dunia ini, sehingga dikurniakannya  
Anaknya yang tunggal itu, supaya barang siapa  
yang pūrchaya akan dia tiada iya akan binasa,  
mulsinkan mūndapat hidop yang kūkal.

**133. LOW MALAY, or Soerabayan, (Batavia.)**

Karna sabagitoe sangat Allah soedah menga-  
sehi isi doenia, sahingga ija soedah membi-  
Anaknja laki-laki jang toenggol, soepaja sasa-  
orang jang pertjaja akan dia, djangin binasa,  
hanja beroleh kahidoepan kakal.

## 134. D A J A K. (Borneo.)

Krana kasiotä kapaham Hatalla djari sinta kalunen, campel iä djari menenga Anake idjä tonggal, nakara gene-genep olo, idjä pertjaja huang iä, äla binasa, baja mina pambelom awang katatahi.

135. JAVANESE.

[illegible]136. BALINESE. (*Dutch E. Indies.*)

Mapan kelo pitresnan Hida sanghyang Widi  
tkou djagaté makedjang, tka Hida nedoenang  
hokané né sanoenggal kahoetes mahi, kua  
Gilag hanaké né ngandelang hi hoka boe-  
hoeng naraka, nanging kua hya nepoekin  
kahlidoepan tan pegat.

### 137. SUNDANESE.

Ajeuna mah dek indit ngadeuheusan ka bapa, sarta rek oendjoekan kijeu: Noen ama, simkoe-ring geus tarima migawe dosa ka sawarga saréng di pajoeneum ama.—(*Luke xv. 18.*)

138. N I A S. (*Island near Sumatra.*)

Ando wa lawá'o ira ma'afefu: Ya'ugō hulo  
dā sogi O'no Lōwaláni? Ba mañu'a o Ia hōrā  
ando: Iāmi' ande mañu'a'o, mē Ia'ōdō ande sō  
Ia andō.—(Luke xxii. 70.)

139. **BATTA** (Toba). (*Sumatra*.)[illegible]

**140. B.ATTA (Mandaheling),**

[illegible]

141-144. CHINESE.

**141. Classical.**

蓋神愛世，甚至以其獨生之子賜之，俾凡信之者，免沉淪而得永生。

## 142. Mandarin.

天主憐愛世人，甚至將獨生子賜給他們，叫凡信他的不至滅亡，必得永生。

### 143. Foochow

因爲神學將欸愛世間，賜獨生其仔，以致大凡信伊其伙都賣沉淪去，是難得長長生活。











## 182. GILBERT ISLANDS.

Ba e bati taniran te aomata iroun te Atua, ma naia are e ana Natina ae te rikitemana, ba e aona n aki mate ane onimakina, ma e na maiu n aki toki.

183. PONAPE. (*Ascension Island.*)

Pue Kot me kupura jappa ie me a ki to ki Na ieroj eu, pue me pojon la i, en ter me la, a en me maur jo tuk.

## 184. MORTLOCK.

Pue an Kot a tane fanufan mi rapur, ie mi a nanai na an Alaman, pue monison mi luku i ra te pait mual ia, pue ra pue uera! manau samur.

185. HAWAIIAN. (*Sandwich Islands.*)

No ka mea, ua aloha nui mai ke Akua i ko ke ao nei, nolaila, ua haawi mai oia i kana Keiki hiwahiwa, i ole e make ka mea manaolo ia ia, aka, e loaia ia ia ke ola mau loa.

## 186. ETHIOPIC.

አስመ: ነጋዘ: አፋር: አገዛዥብር:  
ለዓለፍ: አስከ: ወልደ: ዋሕዶ: ወሀብ: ቢዛ:  
ነጋዘ: ነጋዘ: ከዋሕዶ: ቦቱ: አይተሰጥል:  
አላ: ይረክብ: ሕይወት: ዘለዓለፍ::

187. AMHARIC. (*Abyssinia.*)

አገዛዥብር: አንድሀ: ዓለሙን: ወደዋልፍ:  
አንድ: ልጄን: አስከለወፍ: ድረስ: በርሱ:  
ዶሮ: ሀላ: አንድወልፍ: ዋሕዶ: ወሀብ:  
ሕይወት: ትሆንለት: ዘንድ: አንድ::

188. TIGRE. (*Abyssinia.*)

ነጋዘወግ: ረትወ: አገዛዥብር: ንዓ  
ለፍ: ክሳብ: ከሀብ: ብሕቱ: ንዘተወልደ:  
ወደ: ከወልፍ: ነጋዘ: ዘአፋር:  
ብሕቱ: ክትኹል: አዋብር: ሕይወት:  
ዘለዓለፍ:

189. COPTIC. (*Egypt.*)

Παρητη ταρ ἀφτ μενρε ηκοςμος  
εωστε περσηρη μιματατq ητεq τινq  
ευνα οτοπυκεη εοναεγτ εροq ητεq  
ψτεμτακο αλλα ητεq βι ποτωπδ  
ηεπεε.

190. GALLA. (*South of Abyssinia.*)

Waka akana tshalate tshira alami, Umasa tokitsha aka keñe, kan isati amāne aka hembāne, tshenan feia ala tauſſe garra duri.

## 191. KINIKI.

Nao ossi agomba, hikara uwe ni mana wa Mulungu? aka gomba, muimui munaamba, ni mimi endimi.—*Luke 22: 70.*

192. SWAHILI. (*E. Coast of Africa.*)

Kwani ndivyo Muungu alivyoupenda ulimwengu, akatoa na Mwana wake wa pekee, illi wote wamwaminio waupate uzima wa milele wala wasipotee.

193. SECHUANA. (*South Africa.*)

Gone Morimo o lo oa rata lehatsi yalo, ka o lo oa naea Moroa ona eo o tsöcoefi a le esi, gore moſiue le moſiue eo o rumelaſi mo go èna, a si ka a hëla, mi a ne le botselo yo bo sa khutlefi.

## 194. SESUTO.

Gobane Molimo o ratile lefatsé hakālo, o le nelle Mora oa oona a tsuetseng a 'notsi; gore e mong le e mong a lumelang go éena, a sé ke a fêla, a mpe a be le bophelo bo sa feleng.

195. ZULU. (*South Africa.*)

Ngokuba uTixo wa li tanda kangaka izwe, wa li nika inDodana yake ezelweyo yodwa, ukuba bonke aba kolwa kuyo ba nga bubu, kodwa ba be nobomi obungapeliyo.

196. OTIYEHERERO. (*South Africa.*)

Me serekarere omuhingo: Yehova ua tyere ku ami; "Ove omuatye uandye, m'eyuva ndi mbe ku koatere."—*Psalms 2: 7.*

197. KAFIR. (*South Africa.*)

Ngokuba Utixo walitanda ilizwe kangaka, wada wanika unyana wake okupela kwozelweyo, ukuze osukuba ekolwa kuye angabubi, koko abe nobomi obungunapakade.

198. DAMARA. (*South Africa.*)

Omukuru oty'a suverere ouye, kutya e ua opere mukoteuna ue erike, auhe ngu mn kampura mu ye, ope ha panyara, nokutya ga kare nomuinyo bu ha yanda.

199. NAMACQUA. (*South Africa.*)

||Natigoseb gum Eloba ||hub-ciba gye Inamo, ob gye lleib di lguise ||nai hā lgōaba gye ma, lleib ||na ra tgomn hoan gā-llō tite se, xawen nī lamō ūiba ū-ha se.

**200. DUALLA.** (*West Africa.*)

Loba lo bo wasi ndulo, na a boli mpom mau mo Muna, na motu na motu nyi dube tenge na mo, a si manyami, 'ndi a ma bene longe la lwindia.

**201. IBO.** (*West Africa.*)

*Ma otudhan Tiúku kónru éwá-wana na ánya, ma ya nyéte otú ólì Oparaya, ma onye ówána kwéreye, egagi éfú, ma ga éwete ndu ébigébi.*

**202. HAUSSA.** (*West Africa.*)

*Don Alla ya so dunia hakkanan ši ya bada Dansa nafari, en kowa ya yirda daši, ba ši gbata ba, amma ši yi rai hal abbada.*

**203. NUPÉ.** (*West Africa.*)

*Lugo gbayetinye un nán aisi eye ezabo, a-a-le etun wangi 'yeye, a-fe dżin yebo ndaye nan dan alidzana nan.—(Matt. v. 16.)*

**204. YORUBA.** (*West Africa.*)

Nitori ti Olorun fẹ araiyo tobẹ gẹ, ti o fi Omọ bibi rẹ nikansoso fun ni pe, enikeni ti o ba gbà a gbọ ki yio sẹgbẹ, ẹugbọn yio ni lya ti ko nipekun.

**205. ACCRA, or Ga.** (*West Africa.*)

Si neke Nyongmo sumo dɛc lɛ, akɛ o ngɔ o bi kome, ni a fɛ lɛ, e hã, koni inofumo, ni hep e nɔ yeɔ lɛ, hio a ka kpata, si e na panɔ wola.

**206. TSCHI, or Twi.** (*West Africa.*)

Nà senea Onyankōpɔn dɔ wiase ni, sɛ ɔdɛ ne ba a ɔwoo no koro mɛn, na obiara a ɔgye no di no anyera, na wanyɔ dɔ nkɔwɔ.

**207. MANDINGO.** (*West Africa.*)

Katuko Alla ye dunya kannu nyinuyama, an ading wulukilering di, mensating mo-omo men lata ala, ate tinyala, barri asi balu abadaring sotto.

**208. MENDE.** (*West Africa.*)

*Gbamailɛ Ngɛwɔ iye lɔi lo si a ndɔlɔi, ta lo i ngi lɔi yakpɛi vɛni, iye jɔni; ta lo nɔmumi gbi lo ngi kɔna lo a tɔnya, ɛ lɔhɔ, kɛ kɔnafo lɔwɔ lo a iɔ.*

**209. TEMNE.** (*West Africa.*)

*Tia go K'uru o pot. bɔlɔr ara-rũ, kã o sɔnd Ow'an- Fɔa o kom gbo edn, kama w'uni o w'uni, gwo lãng-kɔ, o tɛe dinnɔ; kɛrɛ kama o sɔlo a-ndɔm aladana.*

**210. BENGA.** (*West Africa.*)

Kakana ndi Anyambě 'a tândâki be, kâ Mâ-a vû Mwan' 'aju umbâkâ, na, uêhêpi a ka kamidê Mâ, a nyange, ndi a na emênâ ya egombe yêhêpi.

**211. GREBO.** (*West Africa.*)

Kâre kro Nyesoa nuna konâ âh nowânena, â hnyina â sêyê âh kôkâ-yu donh, be nyâ be â po nâ hanhte, â neh te wanh, nêma â mu konâ-se-honhnouh kâ.

**212. MPONGWE.** (*West Africa.*)

Kânde Anyambiê arândi ntye yinlâ nli ntâ-ndinli mê avenliê Oŋwanli yê wîkika, inlê om' edu o bekelîê avere, ndo e be doanla nî'emênla zakânlakâ.

**213. DIKELE.** (*West Africa.*)

Nadiambilindî Anyambiê a midinh pênzhe nyi na thadinh thâtî thô tha yê mivê Miana ngwêi ngwadikika, na mutyi jêshê ngwa yê bundliê a tyi magwa, nji a bê' na thaki' th' adukwa jeshê.

**214. GALLA.** (*South of Abyssinia.*)

ፖፖፖ፡ አካፕ፡ ቢያ፡ ለፈ፡ ሥፈ፡  
ጀለተራ፡ ፡፡ አልማ፡ ሥፈ፡ ተክክ፡ ጽሐማ፡  
ኪኑተ፡ ፡፡ ህከን፡ አሳተ፡ አመኑ፡ ሁን፡  
አካንግ፡ ፡፡ ፈም፡ በሪ፡ በሪተ፡ አተ፡  
መሊ፡ ፡፡

**215. BULLOM.** (*Near Sierra Leone.*)

Ntunky kandirr no tre kě aniah ɛ̀boll, leh ngha ngha keh mpant no nkeleng, nu kulluh papah no, wonno cheh ko kě foy.—(Matt. v. 16.)

**216. EWE.** (*Gold Coast.*)

Ke si ke nenem Mawu elɔa xexɛ la me, bena etso ye nũto vɔdsɔdsi deka he na, ne amɛ sya amɛ, si exo edsi ese ko la, mele tsɔtsɔ ge wɔ, nekpe wɔakpo agbɛ mavɔ la.

**217. BERBER.** (*North Africa.*)

مَدِيلَ عَلَّمَ كُنُو ذَمُونِ اَلْهَمَّ مَسْنَمَ اَتَقَمَّ اَرُو  
اَنُونِ اَلْمَعَطِ اَلْعَالِ اَفَقَدَشْ اَمَبَقُونِ اَفَقَنَاوْ  
اَذَبَكِ اَلرَّحِ اَلْعَالِ اَيَّانِ اَفْتَسَقِسْ  
(Luke xi. 13.)

**218. GREENLAND.**

Sillarsub innue Gudib taima assakigei, Ernetue tunniullugo taukkounga, tamarmik taursomunga opertut tammarkonnagit, nãksaung-gitsomigle innursutekarkollugit.



## 219. ESQUIMAUX.

Taimak Gudib sillaksoarmiut nægligtveit, Ernetuane tunnilugo, illunatik okpertut tap-somunga, assiokonnagit nungusultomigle in-nogutekarkovlugit.

## 220. CREE (Roman). (British America.)

Weya Muneto ā ispeōche saketāpun uske, kō mākw oo pauko-Koosisana, piko una tapwāto-wayitche numoweya oo ga nissewunatissey, maka oo ga ayāty kakekā pimatissewin.

## 221. CREE.

ᑎᐱᐱᐱ ᐱᐱᐱᐱ ᐱᐱᐱᐱ ᐱᐱᐱᐱ ᐱᐱᐱᐱ ᐱᐱᐱᐱ  
ᐱᐱᐱ ᐱᐱᐱᐱᐱᐱ, ᐱᐱᐱ ᐱᐱᐱᐱᐱᐱ. ᐱᐱ ᐱᐱ  
ᐱᐱᐱᐱᐱᐱ, ᐱᐱ ᐱᐱ ᐱᐱᐱ ᐱᐱᐱᐱᐱ.

## 222. MICMAC. (Nova Scotia.)

Mūdu Nicseam teliksatus wisitumw wedji igunuma-wedegub-unn newktu-bistadjel mewisul, emlaman m'sit wen tən kedlamsito utjainou, mā ammadt jinpuo, cadw mosest awqawnt minadjmouun.

## 223. TINNE. (Hudson Bay.)

ᑎᐱᐱ ᐱᐱᐱ ᐱᐱᐱ ᐱᐱᐱ ᐱᐱᐱ ᐱᐱᐱ ᐱᐱᐱ, ᐱᐱ  
ᐱᐱ ᐱᐱ ᐱᐱ ᐱᐱᐱ ᐱᐱ ᐱᐱ ᐱᐱᐱ ᐱᐱ ᐱᐱᐱ,  
ᐱᐱᐱᐱ ᐱᐱᐱ ᐱᐱ ᐱᐱᐱ.

## 224. CHIPPEWYAN.

Apeech zhahwaindung sah Keshamunedoo ewh ahkeh, ooge-onje megewanun enewh atah tatabenahwa Kahoogwesejin, wagwain dush ka-tapwayalnemahgwain chebahnahdezesig, cheah-yong dush goo ewh kahkenig pemahtezewiu.

## 225. TUKUDH. (Loucheux Indians.)

Kwugguh yoo Vittukoochanchyo nunh kug kwikyit kettinlzhin, tih Tinji chihthlug rzi kwuntlantsh! chootyin tte yih kyinjizhit rseyet-tetgititelya kkwa, kō sheggu kwundul tettia-

## 226. MALISEET. (New Brunswick.)

Eebūchūl Nūkskam ēdochoe-moosajitpūn oos-kūkūmikw wējemeloōēitpūn wihwebu Ookwōōsūl, wēlaman 'msen wēn tan wēlāmsūtūk oohūkēk, skatūp ūksekāhāwe, kānookūlōo ootelup askū-mowsoogūn.

## 227. MOHAWK. (N. Am. Indian.)

Iken ne Yehovah egh ne s'hakonoronghkwa n'ongwe, nene rodewendeghton nene raonhāon rodewedon rohhāwak, nene onghka kiok taya-kaweghdaghkon raonhage yaghten a-ongh-tonde, ok denghnon aontehodiendane ne eterna adonhēts.

## 228. CHOCTAW. (N. Am. Indian.)

Chihowa yut yakni a i bullo fehna kw, kuna hosh yvmma i yimmikmvt ik illo hosh, amba ai okchayvt bilia yo pisa hi o, Ushi achufa illa holitopa ya auet ima tok.

## 229. SENECA. (N. Am. Indian.)

Neh sēh'gh ne' sōh jih' ha nō'gh gwah Na-wēn ni yōh' he'yo ān ja deh, Neh No'a wak neh' sho' kuh sgat ho wi'yā yāh tot gah wāh' ha o'-gweh da wiīh heh yo ān'ja deh'; neh neh, Sen'-dih gwa'nah ot š o wa' i wagwēn ni yōs, tēh āh' ta ye' i wah dōh', neh gwaa', nā yō' i wa da dyeh' ā ya'go yān dah't' ne' yōh heh' o weh.

## 230. DAKOTA. (N. Am. Indian.)

Wakantanka oyate kin cantewicakiya, heon Cinhintku isnana icage cin wicaqu, qa tuwe awacn kinhan owihanke kte šni, tuka owi-hanke wanin wiconi yuhe kta.

## 231. OJIBWA. (N. Am. Indian.)

Gaapij shauendy ev Kishemanito iu aki, ogion-jimigiuenvn inju baiezhighonijin Oguisvn, aueguen dvsh gotebucienimaguēn jibvnatizisig, jiaiat dvsh iu kagige bimatiziūn.

## 232. MUSKOCHEE. (N. Am. Indian.)

Hesaketvmese ekvny vnokece mahet omekv, Eppuce hvmkuse heckueevte emvtes, mvn estimvt oh ykvsamat estemerkekot, momis hesaketv yuksvsekon ocvren.

## 233. CHEROKEE. (N. Am. Indian.)

ᑎᐱᐱᐱ ᐱᐱᐱ ᐱᐱᐱᐱ ᐱᐱᐱᐱ ᐱᐱᐱ, ᐱᐱᐱ  
ᐱᐱ ᐱᐱᐱ ᐱᐱᐱ ᐱᐱᐱ ᐱᐱᐱᐱ ᐱᐱᐱᐱ, ᐱᐱ  
ᐱᐱ ᐱᐱᐱᐱᐱ ᐱᐱᐱᐱᐱ ᐱᐱᐱ, ᐱᐱᐱᐱᐱ  
ᐱᐱᐱ.

## 234. DELAWARE. (N. Am. Indian.)

Woak- necama guliechtagunenannall kmat tauchowogannenannall, taku kiluna nechoha schuk ulaha wemi elgigunk haki omattauchso woganowa oliechtonepanni.—1 John 2: 2.

## 235. NEZ PERCES. (N. Am. Indian.)

Knuki wiwihnath, awitaishkaikith, uyl-kashliph, wiwatashph, Awibaptalnalkith im-muna Pishltpim wanikithph, wah Miahspim Wanikithph, Wah Holy Ghostnim wanikithph.—Matt. 28: 19.

## 236. MAYAN. (Yucatan.)

Tumen bay tu yacuntah Diox le yokolcab, ca tu caal u pel mchenan Mehen, utial tulacal le max cu yocictuyol ti leti, ma u kaztal, uame ca yanacti cuxtal minanuxul.

## 237. MEXICAN, or Aztec.

Ni mohuaz yhuán ni az campa cá in no tâtzin yhuán nie ihuiz: No tâtzin é, oni tlâtlacó ihuicopa in illhuicatl yhuán mixpan téhuatl.—(Luke xv. 18.)

## 238. NEGRO-ENGLISH. (Surinam.)

Bikasi na so' fasi Gado ben lobbi køndre, va a gi da wan Pikien va hem, va dem allamal, dissí briei na hem, no sa go lasi, ma va dem habi da Liebi vo tehgo.

## 239. CREOLESE. (West Indies.)

Want soo Godt ka hab die Weereld lief, dat hem ka giev sie eenig gebooren Soon, dat sellie almael die gloov na hem, no sal kom verlooren, maer sal hab die eewig Leven.

## 240. AYMARA.

(Peru.)

Hucama Diosaja mundo munana, sapa Yokapa quitani, taque haquenaca iau-siri ifiayan hacafia-pataqui.

## 241. ARRAWACK.

(Gutana.)

Lui ké uduña abba Wadill urla karaijakubá je namaqua Wunabu ubannamamutti, nassikoattoanti tuhu Wunabu ubafiamün. Lui kéwal assikissia namün ikisihü, pattahü na kakünti, hallidi na kassikoanibia ba ukunnamün.—Acts 17: 26.

## 242. QUICHUAN.

(Argentina.)

Pachacamackca chicatami runacunata munarca, chay Zapallay-Churinta kokeurea, tuecuy paypi yfilié, mña huañunapac, uñfay cauzaytari apinanpac.

**BIBLE HOUSE, NEW YORK CITY.** The noble edifice, shown in the accompanying illustration, stands by itself on an open square, bounded by Astor Place, Fourth Avenue, Ninth Street, and Third Avenue, New York city; it covers an area of about three-quarters of an acre, and has a circumference of over seven hundred feet. In the view here given, the shaded, or right front, is on Astor Place; the left, or light front, is on Fourth Avenue. The building is of brick, with freestone copings, and, without being in any way extravagant in



BIBLE HOUSE, NEW YORK.

architectural embellishment, it commands attention by its magnitude, its admirable proportions, and its chaste and attractive finish. No part of the money needed to meet the large cost of the site and of the edifice was drawn from the contributions made for the support of the general work of the society. Generous subscriptions were made to the building fund by friends of the cause, and the balance of indebtedness was early met by the receipts from the rent of such portions of the building as were not needed for the use of the business of the society. The entire edifice is a monument to the liberality of all who contributed toward its erection.

**BIBLIA PAUPERUM, or BIBLE OF THE POOR,** was a sort of picture book of the Middle Ages, giv-

ing the leading events of human salvation through Christ, each picture being accompanied by an illustrative text in Latin. See Britannica, Vol. III, p. 653. A similar work on a more extended scale, with the text in rhyme, was called *Speculum Humanæ Salvationis*, or *Mirror of Human Salvation*. Before the Reformation these two books were the chief text-books used, especially by monks, in preaching. Many manuscripts are preserved in different languages, several as old as the 13th century. The pictures were copied in sculptures, altar-pieces, etc. The chief proof for the invention of printing by Koster in Haarlem rests on the first impressions of the *Speculum Humanæ Salvationis*.

**BIBLE SOCIETIES OF THE WORLD.** The following is a compendium of different Bible Societies of the world, compiled from the lists reported to the American and British and Foreign Bible Societies to Jan. 1, 1891. It shows the dates of organization and the total number of copies of the Scriptures issued severally by the various societies so far as reported up to March 31, 1890. The circulation reported by the British and Foreign Bible Society includes the issues by the various Bible Societies of India, amounting to a total from those societies of 8,534,533 copies:

|                                                    | Total Issues. |
|----------------------------------------------------|---------------|
| American Bible Society, 1816.....                  | 52,736,075    |
| American and Foreign Bible Society, 1837.....      | 2,293,665     |
| American Bible Union, 1850.....                    | 608,184       |
| Bible Association of Friends in America, 1890..... | 154,431       |
| British and Foreign Bible Society, 1804.....       | 123,929,046   |
| National Bible Society of Scotland, 1861.....      | 11,363,941    |
| Hibernian Bible Society.....                       | 4,968,450     |
| Trinitarian Bible Society, in 1884-85.....         | 281,428       |
| Basle Bible Society, 1804.....                     | 815,587       |
| Prussian Bible Society, at Berlin, 1814.....       | 5,262,281     |
| Swedish Bible Society, 1809.....                   | 1,055,507     |
| Finnish Bible Society, at Abo, 1812.....           | 289,273       |
| Russian Bible Society, St. Petersburg, 1812.....   | 861,105       |
| Württemberg Bible Society, 1812.....               | 1,737,526     |
| Zurich Bible Society, 1812.....                    | 82,972        |
| Berg Bible Society, at Elberfeld, 1813.....        | 847,549       |
| Cisle Bible Society, 1813.....                     | 12,267        |
| St. Gall Bible Society, 1813.....                  | 77,660        |
| Schaffhausen Bible Society, 1813.....              | 30,077        |
| Danish Bible Society, 1814.....                    | 404,788       |
| Geneva Bible Society, 1814.....                    | 147,232       |
| Hamburg-Altona Bible Society, 1814.....            | 317,000       |
| Geneva Bible Society, 1814.....                    | 200,000       |
| Lausanne Bible Society, 1814.....                  | 227,667       |
| Lubeck Bible Society, 1814.....                    | 40,000        |
| Saxon Bible Society, 1814, at Dresden.....         | 745,066       |
| Aargovian Bible Society, 1815.....                 | 48,229        |



|                                                                 | Total Issues. |
|-----------------------------------------------------------------|---------------|
| Bremen Bible Society, 1815.....                                 | 90,000        |
| Brunswick Bible Society, 1815.....                              | 6,312         |
| Icelandic Bible Society, 1815.....                              | 10,445        |
| Netherlands Bible Society, 1815.....                            | 1,678,683     |
| Schleswick-Holstein Bible Society, 1815.....                    | 195,450       |
| Strasbourg Bible Society, 1816.....                             | 117,830       |
| Frankfort Bible Society, 1816.....                              | 75,000        |
| Lauenburg-Ratzeburg Bible Society, 1816.....                    | 32,567        |
| Lippe-Deinold Bible Society, 1816.....                          | 37,199        |
| Neuchâtel Bible Society, 1816.....                              | 37,043        |
| Norwegian Bible Society, 1816.....                              | 480,075       |
| Rostock Bible Society, 1816.....                                | 19,408        |
| Waldensian Bible Society, at La Tour, 1816.....                 | 4,328         |
| Berne Bible Society, 1817.....                                  | 257,650       |
| Eutin Bible Society, for the Principality of Lubeck, 1817.....  | 15,000        |
| Hesse-Darmstadt Bible Society, 1817.....                        | 81,484        |
| Waldeck and Pyrmont Bible Society, 1817.....                    | 2,800         |
| Eisenach Bible Society, 1818.....                               | 15,000        |
| Göttingen Bible Society, 1818.....                              | 41,000        |
| Mulhausen Bible Society, 1818.....                              | 61,071        |
| Hanau Bible Society, 1818.....                                  | 3,316         |
| Hesse-Cassel Bible Society, 1818.....                           | 30,000        |
| Protestant Bible Society, at Paris, 1818.....                   | 888,150       |
| Leipzig Bible Society, 1818.....                                | 85,000        |
| Glarus Bible Society, 1819.....                                 | 5,000         |
| Ionian Bible Society, at Corfu, 1819.....                       | 7,377         |
| Marburg Bible Society, 1819.....                                | 22,450        |
| Colmar Bible Society, 1820.....                                 | 97,741        |
| Duchy of Baden Bible Society, 1820.....                         | 90,820        |
| Anhalt-Bernburg Bible Society, 1821.....                        | 4,786         |
| Weimar Bible Society, 1821.....                                 | 7,236         |
| Bavarian Protestant Bible Institution, at Nuremberg, 1823.....  | 391,412       |
| Stavanger Bible Society, 1828.....                              | 7,017         |
| French and Foreign Bible Society, at Paris, 1833.....           | 750,000       |
| Antwerp Bible Society, 1834.....                                | 459           |
| Belgian and Foreign Bible Society.....                          | 7,623         |
| Ghent Bible Society, 1834.....                                  | 8,880         |
| Anhalt-Dessau Bible Society, 1836.....                          | 31,003        |
| Belgian Bible Associations, 1839.....                           | 14,909        |
| Altenberg Bible Society, 1834.....                              | 24,100        |
| Bible Society of France, 1834.....                              | 558,149       |
| Russian Evangelical Bible Society, at St. Petersburg, 1831..... | 1,025,467     |
| Imperial Russian Bible Society, at St. Petersburg, 1838.....    | 1,223,044     |

The British and Foreign Bible Society reported March 31, 1890, a list of 3,279 auxiliary and branch Bible societies; the American Bible Society at the same reported a list of 2,034, aggregating a total of 5,313 auxiliary and branch societies which are connected with those two parent societies, and whose names are not given in the foregoing list. The number of branch and auxiliary societies connected with other parent organizations cannot be given, as some of them have published no recent statistical reports. The Russian Bible Society, previous to its suspension by imperial ukase in 1826, had 289 auxiliaries. As most of the auxiliaries embraced in the figures given above report subordinate societies representing smaller territorial districts, it is estimated that the number of distinctive Bible organizations, including auxiliaries, in the world probably exceeds 10,000.

**BIBLIOMANCY**, a mode of divination much practiced during many ages by opening the Bible and observing the first passage that occurred, or by taking notice of the first words of the Bible heard after entering a place of worship. The application was often very fanciful. Prayer and fasting were sometimes used as a preparation for a mode of consulting the Divine oracles, than which nothing could be more contrary to their purpose and spirit, and which was in harmony only with the notions and practices of heathenism. It was prohibited under pain of excommunication by the Council of Vannes, A. D. 465, and by the Councils of Agde and Orleans in the next century. It continued, however, to prevail many centuries after, and was introduced into England at the Norman Conquest. It was essentially the same as the *Sortes Virgilianæ*, the only difference being the book employed.

**BIBLIOMANIA** (from Gr. *biblion*, "a book," and *mania*, "madness") may be defined as a passion for collecting and hoarding rare or curious books. The

last century and a half has witnessed a marked manifestation of this taste both in Europe and in the United States. The bibliomaniac values books, not alone for their intrinsic worth, but for their scarcity, their age, their binding, and even for some grave blemish. Even a very common book takes on a fictitious value in the collector's eyes if it be the only known copy in existence, or be printed in black letter, or have the stamp affixed of some long dead but famous binder. The formation of complete sets of such books, or of the works of a single author, provided they be rare, is a favorite pursuit with many. The editions of the classic writers most affected by collectors are the beautiful *Elzevirs* and the *Foulises*. Some of these have, at various times, brought fabulous prices. As much as £3,900 has been paid for a Mazarin Bible, and the first dated copy of Boccaccio's *Decamerone*, 1471, was sold for \$2,260. A psalter, printed by Rüst and Schöffer in 1459, fetched £4,950 at a sale in London in 1885. A copy of the Gutenberg Bible in two volumes, printed in 1455, the first book printed from movable type, was purchased at the Brayton Ives sale in New York, March 14, 1891, by J. W. Ellsworth, of Chicago, for \$14,800. Such books as these are valued solely on account of their antiquity; works of a later date are prized on account of their beauty or fine workmanship. See *Britannica*, Vol. III, pp. 654, 655.

**BICARBONATES** differ from carbonates in containing twice as much carbonic acid. Bicarburets, bisulphurets and bitartrates are words formed on the same plan; but in recent chemical nomenclature the prefix *bi-* has been superseded by *di-*.

**BICE**, the name of two pigments, of a blue and green color respectively, known to artists from the earliest times. Both are native carbonates of copper, but are also prepared artificially. In its native state, however, bice is more durable, and in the case of green is especially much more brilliant. Artificial blue bice is known as Hambro blue, mineral blue, etc.; artificial green bice, as mountain green, Paul Veronese green and emerald green.

**BICEPS**, the muscle which gives a full appearance to the front of the arm. Above it consists of two portions or heads—whence its name—one being attached to the coracoid process of the scapula, the other to the margin of the depression on that bone which lodges the head of the humerus. The former is the short, the latter the long, head of the biceps. They unite to form a fleshy belly, which terminates in a rounded tendon. The biceps tendon is inserted into the tubercle of the radius. Before passing to this insertion it gives off an expansion, which separates the medium basilic vein from the brachial artery in the situation generally selected for venesection. The action of the biceps is rapidly to bend the forearm and also to supinate the hand.

**BICESTER**, a market town of Oxfordshire, England, 12 miles northeast of Oxford. There are manufactories of rope, clothing, sackings and pale ale, and several important fairs are annually held here. The ruins of *Alia Castra*, or Alcester, lie 1½ miles to the southwest, on the ancient Roman Ake-man Street. Population, 3,300.

**BICETRE**, originally the name of a very old castle, in the neighborhood of Paris, commanding one of the finest views of the city, the Seine, and the environs. It was destroyed in 1632, because it had become the hiding place of thieves. It was rebuilt by Louis XIII, and made a hospital for old soldiers. Afterwards it served as a prison for 2,000 culprits, mostly condemned to the galleys, as well as a hospital for incurable lunatics. Wool-spinning and glass-polishing are carried on in the building.

**BICKERSTAFF, ISAAC**, an author of numerous comedies and light musical pieces, which had at one time a great popularity. He was born in Ireland in 1735. He became page to Lord Chesterfield and was afterwards an officer of marines, but was dismissed. Nothing is certainly known regarding his after life. His best known pieces are *The Maid of the Mill*; *The Padlock*; *He Would if He Could*; *Love in a Village*; *The Hypocrite*, and *The Captive*.

**BICYCLE**. Besides the ordinary bicycle described in Britannica, Vol. III, p. 665, consisting of a large wheel followed by a small one, several varieties have been introduced, the general purpose of which is the rider's safety. In one of these the wheels are reversed, the motive power being transmitted to the large wheel by levers and the small front wheel being used for steering. Others have smaller driving-wheels than usual, and are therefore lower, and the motive power is transmitted from pedal-levers to the axle by endless chains or secondary cranks.

The introduction of the pneumatic tire in 1890 resulted in a marvelous improvement in speed at both short and long distances, whether on path, road or grass. This is a large, hollow, India-rubber tire filled with compressed air. A modification of this, known as the cushion, also adopted in 1890, is a strong, hollow, India-rubber tire several times larger in diameter than the usual solid tire.

The present record, 1891, for one hour, is 22 miles, 620 yards; for two hours, 41 miles, 1,180 yards; for three hours, 60 miles, 1,255 yards. The following are the present best records for given distances:

|                           |                       |
|---------------------------|-----------------------|
| Miles $\frac{1}{4}$ ..... | Hr. 0 Min. 0 Sec. 314 |
| Miles $\frac{1}{2}$ ..... | Hr. 0 Min. 1 Sec. 8   |
| Miles 1 .....             | Hr. 0 Min. 2 Sec. 20  |
| Miles 2 .....             | Hr. 0 Min. 4 Sec. 59  |
| Miles 3 .....             | Hr. 0 Min. 7 Sec. 38  |
| Miles 4 .....             | Hr. 0 Min. 10 Sec. 18 |
| Miles 5 .....             | Hr. 0 Min. 12 Sec. 54 |
| Miles 10 .....            | Hr. 0 Min. 26 Sec. 41 |
| Miles 20 .....            | Hr. 0 Min. 53 Sec. 45 |
| Miles 50 .....            | Hr. 2 Min. 25 Sec. 28 |
| Miles 100 .....           | Hr. 5 Min. 50 Sec. 5  |

**BIDA, ALEXANDRE**, an eminent French artist, born at Toulouse in 1823. He was a pupil of Delacroix. He became a member of the Legion of Honor in 1855, and an officer of the Legion in 1870. Among his principal works are a series of designs, in two volumes, illustrating the Evangelists, and a water-color painting, *The Massacre of the Mamelukes*, the property of the Metropolitan Museum of Art, New York.

**BIDAR**, a town in the Nizam's dominions, situated near the right bank of the Manjera, a tributary of the Godavery, 75 miles northwest of Hyderabad. Formerly a place of importance, it is now remarkable chiefly for its manufactures in a compound metal made of tin, copper, lead and zinc, and called bidderyware. This industry has been of late declining. The district of Bidar has an area of 4,884 square miles, and a population of 80,000.

**BIDASÓN**, a river which, rising in Spain, forms the boundary between Spain and France and falls into the Bay of Biscay, at Fuenterrabia. The treaty of the Pyrenees was concluded on an island in its mouth in 1659.

**BIDDEFORD**, a city of Maine, in the county of York, situated at Saco Falls, on the Saco River, six miles from the ocean. The city has an abundant supply of pure water, is well lighted with gas and electricity, has an electric fire alarm and street railways, and excellent schools. The high school building, erected in 1888 at a cost of \$50,000, is one

of the best in the State. Superior granite is found in the vicinity in inexhaustible quantities. The Lincoln Monument, at Springfield, Ill., is built of this granite. Biddeford was first settled in 1616, incorporated as a town in 1718, and as a city in 1855. Population in 1890, 14,418.

**BIDDING-PRAYER**, a form of exhortation, always concluding with the Lord's Prayer, enjoined by the 55th canon of the Anglican church in 1603, to be used before all sermons and homilies. Except in cathedrals and the university churches, it is now seldom used. The term is from the Anglo-Saxon *biddan*, "to pray," so that bidding-prayer is really pleonastic; but after the 16th century the word *bidding* came to be popularly regarded as an adjective, or *bidding-prayer* as a compound; a prayer which directs what is to be prayed for. The form is of extreme antiquity, and was anciently used for the communicants or believers after the dismissal of the catechumens, and was pronounced by the deacon, each petition beginning with the words, "Let us pray for," etc.

**BIDDLE, CLEMENT**, "Quaker soldier," born in Philadelphia, May 10, 1740, died there July 14, 1814. His parents were Quakers, and he was brought up with much strictness. Mr. Biddle, at the head of a company of Quakers and others, repelled a force of desperadoes in 1764, and from that time was active in all military actions of the day. He was a soldier of the Revolutionary War, and present at the battles of Princeton, Germantown, Brandywine and Monmouth. After the war he held important public offices. He was a personal friend of General Washington.

**BIDDLE, JAMES**, born at Philadelphia in 1783, died there Oct. 1, 1848. He entered the navy and saw service on board the *Philadelphia* and *Wasp*, and was commander of the captured *Frolic*. He was made prisoner near Tripoli, while on board the wrecked *Philadelphia*, and just after receiving command of the *Frolic*, the ship and crew fell into British hands. On being exchanged Captain Biddle's rank was raised and he was given command of the *Hornet*. He captured the *Penguin*, and then sailed for the Cape of Good Hope. He had a narrow escape from a British ship of war, which followed so closely that he had to throw his guns overboard. On returning to New York many honors were bestowed on him for his fine seamanship and gallant conduct. Subsequently he saw much active service, commanding the Mediterranean squadron in 1831, and in 1845 the East India squadron, which sailed to China to make a treaty with that country.

**BIDDLE, NICHOLAS**, born at Philadelphia, Sept. 10, 1750, killed in action, March 7, 1778. At the age of thirteen he made a voyage to the West Indies. In 1770 he entered the British navy, but deserted his ship three years later to go with Captain Phipps on an Arctic expedition. On his return he had gained sufficient experience to fit him for the command of a vessel and he was placed in charge of the *Andrea Doria*. From this time to his death Captain Biddle was extremely fortunate in his engagements with British ships. He captured two cruisers off Montauk Point, two transports and several merchantmen near Newfoundland, and four ships near Charleston, South Carolina. On March 7, 1778, while cruising in this vicinity with a fleet of five vessels (his own being the *Randolph*), he fell in with the *Yarmouth*, a heavily armed British vessel. In the action which ensued the *Yarmouth* sustained severe injuries and the *Randolph* was blown up and most of the crew perished. Captain Biddle's death was a great loss to the navy of the young Republic.

**BIDDLE, NICHOLAS**, financier, and descendant of a famous family several of whose members took



part in the Revolutionary War. He was born at Philadelphia, Jan. 8, 1786, died there, Feb. 27, 1844. He was a precocious youth, and could have graduated at the University of Pennsylvania at the age of thirteen. He graduated from Princeton in 1801, standing at the head of his class. He went abroad as secretary to John Armstrong, minister to France; was directed to audit and pay claims against the nation, using the purchase-money of Louisiana; was secretary for Mr. Monroe when he went as minister to Great Britain. In 1807 he returned home and practiced law, giving his leisure to literary pursuits. He was assistant editor of the "Portfolio," and prepared the report of Lewis and Clark's expedition to the mouth of the Columbia River from their notes. In the legislature to which he was elected in 1810 he originated an educational bill which was so far in advance of the times that it could not be passed till 1836, when a bill similar to it was carried through the legislature. Mr. Biddle was largely influential in rechartering the United States bank. He was appointed a government director, and later president of the bank. In 1829 President Jackson's war on this institution undermined its credit, and a financial panic ensued, which all the efforts of Mr. Biddle were unavailing to ward off. He resigned the presidency in 1839, and the following year the bank failed. Mr. Biddle was a man of great and varied talents, and one who commanded the confidence of all who knew him.

**BIEBRICH**, a town on the right bank of the Rhine,  $2\frac{1}{2}$  miles south of Wiesbaden. It has the castle of the dukes of Nassau, and several factories. Population, 10,000.

**BIELA**, **WILHELM**, **BARON VON**, a German astronomer, born at Rosla, Prussia, in 1782, died in 1856. He discovered the comet known as Biela's comet. See Britannica, Vol. VI, p. 192; Vol. XVI, p. 111.

**BIELO-OZERO** ("white-lake"), a lake in the government of Novgorod, Russia. It doubtless receives its name from the milky appearance given to its water in stormy weather by the white clay of which its bed is composed.

**BIELSHÖHLE**, a singular cavern in one of the Harz Mountains, called Bielstein, on the right bank of the Bode, in the duchy of Brunswick, Germany. It was discovered in 1768. The entrance to it is more than 100 feet above the bed of the stream. The cavern is divided into eleven main compartments, and contains a great deal of that curiously freakish work which Nature delights to execute, stalactites.

**BIELSK**, a town of Russian Poland, 25 miles south of Bialystok. It is situated in a very fertile district watered by the Narev and Nurzek. It is well built, and has a fine custom-house. Population, 10,000.

**BIENNE, LAKE**, a body of water 10 miles long by from 1 to 3 wide, situated in Berne near the foot of the Jura Mountains. It is famous for inclosing the island St. Pierre, where J. J. Rousseau lived in 1765. In the southeastern part of the lake, the submerged, pre-historic remains of a village of lake-dwellers have been found.

**BIELZY**, a manufacturing town of Russia, about 150 miles northwest of Odessa. It is noted for an annual fair, which is held here.

**BIENNIALS**, plants which do not blossom the first season of their growth, but flower and bear fruit in the second season, and then die. Plants which in ordinary circumstances are biennials, often become annuals when early sowing, warm weather, or other causes promote the earlier development of a flowering stem. If, on the other hand, the flowering of the plant is prevented, or in many cases, if it is merely prevented from ripening its seed, it will continue to live for a much longer pe-

riod; as, for instance, a bed of parsley, if regularly cut, will remain productive for a number of years.

**BIENVILLE**, **JEAN BAPTISTE DE**, born in Montreal in 1680, died in 1768. With his brother, Le-moine d'Iberville, he undertook an expedition in 1699, to the mouth of the Mississippi. He was the founder of the city of New Orleans, and was three times appointed governor of Louisiana.

**BIERSTADT**, **ALBERT**, born in Düsseldorf, Germany, Jan. 7, 1830. His taste for art was early shown, as he made excellent crayon sketches in his youth, and at the age of 20 had begun work in oils. Three years later he went from New Bedford, Mass., where he had been brought up, to his birthplace, spending four years in the study of art, and then going to Rome to further prosecute his studies. In 1857 he returned to America, making an extensive tour through the West, where he obtained material for many subsequent paintings. He has three times visited Europe, and has had many honors conferred upon him both at home and abroad. Bierstadt is famous for his pictures of mountain scenery. *Laramie Peak, Looking Down the Yosemite, Valley of the Yosemite, In the Rocky Mountains, and California Oaks*, are among his best-known works.

**BIERVLIET**, a village of the Netherlands, province of Zeeland, 73 miles east-northeast of Sluis. It was the birthplace of William Beukels, who, in 1386, invented the method of curing herrings. In 1377 Biervliet was detached from the mainland by an inundation and still remains insular.

**BIES-BOSCH**, a marshy sheet of water of the Netherlands, between the provinces North Brabant and South Holland, formed in November, 1421, by an inundation which destroyed 72 villages and 100,000 people, and forming that part of the estuary of the Maas called Holland's Diep.

**BIGA**, a Roman term applied in ancient times to vehicles drawn by two horses abreast. In shape it resembled the Greek war-chariot—a short body on two wheels, low and open behind, where the charioteer entered, but higher and closed in front.

**BIGAMY**. See Britannica, Vol. III., pp. 668-69. In the United States, the principal points of difference between the laws of the various individual States are, as to whether the offense is indictable in the State in which the ceremony of marriage takes place or in that in which the bigamous parties actually cohabit, and, further, as to whether a ceremonial marriage must be established at all. Otherwise, the general principles of the common law holds good either by usage or by statutory enactment, in all the States alike.

**BIG BETHEL**, a locality in Virginia, about 10 miles northwest of Fortress Monroe. It was the scene of an engagement, June 10, 1861, in which a body of Union troops, being sent by General Butler to dislodge a detachment of Confederates commanded by General Magruder, were repulsed with considerable loss.

**BIG BLACK RIVER**, an affluent of the Mississippi, which it enters at Grand Gulf. It is about 200 miles in length, and is navigable for about 50 miles. Its banks were the scene of important military operations in connection with the taking of Vicksburg in 1863. At a bridge crossing the river about 15 miles east of that city, the Union forces under General Grant carried the works of the Confederates under General Pemberton, May 17, capturing all on the east side and driving those on the west bank to their final retreat within the defenses of Vicksburg.

**BIG BONE LICK**, a saline spring of Kentucky, about 12 miles south of Burlington. It is noted for the numerous bones found here of the mastodon and other extinct animals, which are believed to

have come to "lick" the salt and to have perished in the then marshy soil.

BIGELOW, ERASTUS BRIGHAM, born at West Boylston, Mass., April 2, 1814, died at Boston, Dec. 6, 1879. His father, a cotton weaver, intended he should study medicine, but Erastus turned his attention to invention. In this field, toward which he had a peculiar bent, he was successful. Some of his inventions were a hand-loom for suspender-webbing, an automatic loom for weaving fine counterpanes, a loom for weaving coach-lace, and power looms for the weaving of two-ply ingrain carpets, tapestry and tapestry velvet carpets. He did much to further the prosperity of Clinton, Mass., was a writer on the protective tariff, author of a work on stenography, and a member of the Boston Historical Society.

BIGELOW, JACOB, born at Sudbury, Mass., Feb. 27, 1787, died at Boston, Jan. 10, 1879. He was a Harvard graduate and a physician of Boston. Being a famous botanist, he was chosen as one of a committee of five to form the American Pharmacopoeia. He had an extensive correspondence with scientific men of Europe, several of whom named plants for him. For 20 years he was physician of the Massachusetts General Hospital, for 40 years professor of *materia medica* in Harvard, and from 1816 to 1827 held the Rumford professorship in the college. For many years he was president of the Massachusetts Medical Society and of the American Academy of Arts and Sciences. Dr. Bigelow was interested in educational work, and labored for the establishment of technical schools. He contributed articles for magazines, and wrote several books, some of which were: *Florula Bostoniensis*, *Elements of Technology*, *History of Mount Auburn* (he was the founder of this cemetery), and *Nature in Disease*.

BIGELOW, JOHN, journalist, born at Malden, N. Y., Nov. 25, 1817. He was a graduate of Union College and practiced law in New York. He left the law and entered journalism. He edited "The Plebeian" and the "Democratic Review," was inspector of Sing Sing prison; partner with William Cullen Bryant in the "Evening Post," minister to France (1865-67); secretary of the State of New York (1867-68); made an honorary member of the New York Chamber of Commerce (1886); and trustee of Samuel J. Tilden's estate.

BIGG, or BIG BARLEY, a local name for a kind of winter barley grown in Northern Europe, especially in Scotland. It is the common bere, or four-rowed barley, *Hordeum vulgare*.

BIGGAR, a town of Lanarkshire, situated 28 miles southwest of Edinburgh, with which it has connection by rail. The Collegiate Church of St. Mary was founded in 1545; of Bognhall Castle, the seat of the great Fleming family, hardly a vestige remains. Dr. John Brown, author of *Rab and His Friends*, was born in the United Presbyterian manse; and John Gladstones (1693-1756), great-grandson of W. E. Gladstone, is buried in the churchyard. Population, 1,556.

BIGGLESWADE, a market-town at Bedfordshire, 41 miles northwest of London by rail. It is a great corn market. Population, 4,947.

BIGHORN, a navigable river of the United States, and the largest affluent of the Yellowstone, rises near Fremont's Peak in the Rocky Mountains, in the northwest of Wyoming, and has a course of about 350 miles.

BIGHT, in nautical language, the bent or doubled part of a rope. Thus one anchor may "hook the bight" of the cable of another, and thereby cause entanglement. In geography bight has much the same sense as "bay."

BIGNONIA, a genus of American tropical and sub-tropical plants, typifying the natural order

*Bignoniaceæ*. It includes many very handsome climbers which bear a beautiful bell-shaped flower—notably the gorgeous trumpet flower, *Tecoma radicans*, or *Bignonia radicans* of the United States.

BIGNONIACEÆ, a natural order of exogenous plants, generally with compound leaves. The flowers are showy, and are among the most striking ornaments of tropical forests. The corolla is of one petal more or less trumpet-shaped and irregular, the stamens are five in number and unequal, the ovary is free, seated on a disk, one to two-celled, the fruit sometimes capsular sometimes drupaceous. There are about 500 known species; in many cases noble trees, and some of them afford valuable timber. The fleshy sweet root of *Craniolaria annua* is preserved in sugar as a delicacy by the Creoles.

BIGORRE, a mountainous district in the southwestern part of France, formerly belonging to Gascony, but now for the most part embraced in the department of Hautes-Pyrenees. Tarbes has been the chief town since the days of the Romans.

BIG RAPIDS, a city of Mich., county-seat of Mecosta county. It is situated on the Muskegon River, about fifty-five miles north of Grand Rapids. It is a very important lumber market, and has an extensive water-power and numerous manufactories of shingles, lumber, and furniture, besides a number of mills, foundries, and machine-shops.

BIG SANDY RIVER, also called CHATTERAWAH, a navigable affluent of the Ohio, formed by the junction of two branches which rise in Virginia. The west fork traverses several counties of Kentucky, and the east fork is, during the latter part of its course, the boundary between the two States.

BIHACH, one of the strongest fortress towns of Croatia, European Turkey, situated on an island in the Una, near the frontier of Dalmatia. It has been the scene of frequent contests during the Turkish wars. Population, 3,000.

BIHAR, a county of Hungary, with an area of 4,279 square miles. It is mountainous in the east, and has barren heaths and marshes in the west. The western part has many small rivers. Wheat, wine and tobacco are largely produced.

BIHE, a fruitful district of South Africa, east of Benguela, and under Portuguese influence. The eastern part rises to a lofty plateau, where the climate is delightful. Bihe is an important caravan center, as the only route across the continent south of the Congo passes through it. The trade is chiefly in slaves and ivory. Area, 2,500 square miles. Population, 95,000.

BIJAWAR, a petty native state in the Bundelkhand Agency, with an area of 974 square miles. Diamonds and ironstone are found. The country is poor and hilly. Population, 113,285.

BIJBAHAR, next to the capital the largest town of Cashmere, situated on the banks of the Jailum, about 25 miles to the southeast of the metropolis, in latitude 33° 47' north and longitude 75° 13' east. A feature worthy of notice is a wooden bridge across the Jailum which, notwithstanding its simplicity and fragility, has endured for centuries.

BIJBHARU, or BIJBAHAR, a town in Kashmir state, India, on the Jhelum, 25 miles southeast of Serinagar. It is the second city in the state.

BIKH, the name given by the natives of India to a poison derived from the roots of *Aconitum ferox*, a species of aconite.

BILANDER, a small two-masted merchant vessel, distinguished from others chiefly by a peculiar shape and arrangement of the main-sail. Of these vessels, which were probably of French origin, there are few remaining.

BILBERRY, a shrub and its fruit, *Vaccinium myrtillus*, the European whortleberry. In Scotland



the bilberry is called *blueberry*, from its *blue* or dark-blue color.

**BILBILIS**, an old Iberian city of Spain, two miles east from Calataynd, in the province of Saragossa, celebrated as the birthplace of the poet Martial; also famed for its highly-tempered steel blades. Under the Romans it was a municipal town with the surname Augusta.

**BILBOES**, long bars or bolts of iron with shackles sliding on them and a lock at one end. When an offender on ship board is "put in irons," it implies that bilboes are fastened to him more or less ponderous according to the degree of his offense. The bilboes clasp the ankles as the handcuffs clasp the wrists.

**BILGE**, the part of the bottom of a ship nearest the keel, and always more nearly horizontal than vertical. A ship usually rests on the keel and one bilge when aground. The name *BILGE-WATER* is given to rain or sea-water which trickles down to the bilge, and which, being difficult of access, becomes dirty and offensive.

**BILHARZIA** (*Distomum*), a parasitic flat worm in the fluke or Trematode order, and belonging either to the same genus as the common liver-fluke, *Distomum hepaticum*, or to one very closely related. In all other Trematodes the sexes are united, the animals are hermaphrodite, but here, the male being the larger, retains the female in a grooved canal, formed by an involution of the edges of the concave side of the body. Pairs thus united are found in the blood-vessels of man, especially in the urinary organs, the ova escaping through an ulceration caused by the presence of the parent. They occur from Egypt southwards to the Cape. It is said that about half of the Fellah and Copt population of Egypt suffer from this parasite. It was named after Theodore Bilharz, an old helminthologist. See *Britannica*, Vol. XXIII, p. 540.

**BILIN**, a town of Bohemia, beautifully situated in the valley of the Bila, and famous for its mineral springs, the waters of which it exports to the extent of 500,000 jars annually. It has two castles, and in its vicinity there is a remarkable isolated clinkstone rock, called Biliner Stein, and the Tripoli earth found at Bilin has been shown to be the remains of infusoria. It has manufactories of cotton-yarn. Population, 3,000.

**BILL**, or **GISARME**, a weapon of warfare used in England and on the Continent before the introduction of firearms. It was a kind of battle-axe having a blade shaped somewhat like a sickle, to which a drawing movement was given in striking.

**BILL**, or **BEAK**. See *Britannica*, Vol. III, pp. 699-717.

**BILLARDIERA**, or *Applebury*, a genus of shrubs of the natural order *Pittosporaceæ*. They have simple alternate evergreen leaves, and axillary pendulous flowers. The flowers have a calyx of five sepals, and a bell-shaped corolla of five petals. The fruit is a soft spongy pericarp with inflated cells. It is edible, although not destitute of a resinous character, which prevails in the order. It is a native of Australia.

**BILLINGS**, an important city of Montana, county-seat of Yellowstone county, situated on the north bank of the Yellowstone River, about sixty miles above the mouth of the Big Horn. It is an important wool-market, and the shipping-point for the stock-ranges of the surrounding country. Artificial irrigation is rapidly extending the area of cultivated land in the vicinity.

**BILL-BROKERS**, persons who, being skilled in matters pertaining to the money-market, engage, either on their own account or that of their employers, in the purchase and sale of foreign

and inland bills of exchange, and promissory notes.

**BILL-CHAMBER**, a department of the court of sessions in Scotland which deals with all matters of a summary nature, and generally all cases requiring the immediate interposition of judicial authority for arrestment of funds or inhabitation of heritable property, for stay or suspension of diligence or execution. Since 1813 the bill-chamber is presided over by a single judge, called the lord ordinary on the bills, and during the sittings of the court of sessions the position is occupied by the last-appointed judge of the court; but in vacation the bill-chamber exercises many of the powers of the court of sessions, and is presided over by a rotation of judges.

**BILLET**, in architecture, an ornament belonging to the Norman style, much used in early mediæval work, resembling a billet of wood, or a small section of round molding, of which a series were placed at regular intervals in or upon a molding. When used in several rows the billets were placed alternately.

**BILLET**, in heraldry, a bearing in the form of a small rectangle, represented flat without shadow or relief. A field or charge strewn with an indefinite number of billets is called *billey* or *billette*.

**BILL IN EQUITY**, a statement of a plaintiff's case in a suit in equity. It is said to be an original bill if it initiates the suit, and a bill not original if used for the purpose of controverting, suspending, or revising a proceeding, or for cross-litigation.

**BILLINGS**, a small railroad town of Christian county, Mo., distant 261 miles from St. Louis. The Southwestern Christian College and the Christian Colony are located here. It has manufactories of flour, plows, and wagons.

**BILLINGS**, **JOSH**. See **SHAW**, **HENRY W**.

**BILLINGSGATE**, a wharf and fish market a little below London Bridge. It was opened in 1558 as a landing place for provisions, and in 1699 was made a free and open market for all sorts of fish. It is the only wholesale fish market in London. The fishermen consign their cargoes to the dealers, who occupy stalls in the market, and these supply the retail dealers. An officer has the general superintendence of the market, and the quality of all fish offered for sale is tested by inspectors. See *Britannica*, Vol. XIV, p. 829.

**BILLINGTON**, **ELIZABETH**, a celebrated English singer, born in London in 1769, died in 1818. She was the daughter of a German musician named Weichsel. She early came forward as a performer on the piano and as a composer, and having married her music teacher, Thomas Billington, she appeared with brilliant success on the opera stage in Dublin in 1786. She perfected her musical education under Sacchini in Paris, who wrote for her his opera, *Inez de Castro*, while she was singing in Naples in 1794. She appeared subsequently in Venice and Rome, retiring from the stage in 1809.

**BILL OF ADVENTURE**, a writing by a merchant ship-owner or master to show that goods shipped by him on board a certain vessel are the property of another, whose *adventure* or chance the transaction is, he himself being responsible only for their delivery. Generally, in commercial law, an *adventure* may be said to be a speculation in goods shipped under the care of a *supercargo*, to be disposed of by him to the best advantage, for the benefit of his employers.

**BILL OF ATTAINDER**. See *Britannica*, Vol. III, p. 52; Vol. VIII, p. 330. In the United States the passage of any bill of attainder, by Congress or

by an individual State, is prohibited by the Constitution.

**BILL OF CREDIT**, a letter authorizing a third party to give credit to a second on account of the first. It is known as a special bill of credit if the third party is specifically addressed, and as a general bill if addressed indefinitely to any who may see fit to give the bearer the credit proposed. The term, as used by the Constitution of the United States, which prohibits the emitting of bills of credit by any State, is construed to mean paper issued by a State on its mere faith and credit to be circulated as legal tender.

**BILL OF EXCEPTIONS**, a statement of objections, by way of appeal, against the decision of a judge who is trying a case with a jury in the court of sessions. The objection may be that the judge has misdirected the jury in point of law, or has improperly rejected or admitted evidence. The phrase was, prior to the judicature act, also used in England in the same sense, but is now merged in the "motion for a new trial."

**BILL OF HEALTH**, a certificate, signed by a consul or other authority, delivered to the master of a ship at the time of clearing from a port or place suspected of being subject to infectious disorders, certifying the state of health at the time that such ship sailed. A *clean bill* imports that at the time the ship sailed no infectious disorder was known to exist. A *suspected bill*, commonly called a *touched patent* or bill, imports that there were rumors of an infectious disorder, but it had not yet appeared. A *foul bill*, or the absence of a *clean bill*, imports that the place was infected when the vessel sailed.

**BILL OF MORTALITY**, a return of the deaths within a certain district, specifying the diseases, and giving a progressive view of the age at death.

**BILL OF PAINS AND PENALTIES**. See Britannica, Vol. VIII, p. 365. The provision of the Constitution of the United States that no bill of attainder, nor any *ex post facto* law, shall be passed by Congress or by a State is held to include bills of pains and penalties.

**BILL OF RIGHTS**. The history of the English bill of rights, and its effect upon the constitutional history of this country, are narrated in Britannica, Vol. XX, p. 555. Many of its provisions have been inserted literally in the amendments to the Constitution of the United States, and are found in our State constitutions.

**BILL OF SIGHT**, an entry of imported goods of which the merchant does not know the quantity or quality. This is permitted to save time by the customs authorities on sworn information. The bill must be made perfect in three days by indorsing the particulars required for warehousing, payment of duty, or delivery free of duty. If the entry is not completed within a month the goods are sold.

**BILL OF STORES**, a list of necessary stores and provisions carried by merchant ships. It is made out by the master and countersigned by the collector of customs, the object being to prevent frauds on the revenue.

**BILLOM**, a town of France, in the department of Puy-de-Dôme, situated on a hill 14 miles east south-east of Clermont. It is one of the most ancient towns of Auvergne, and was formerly surrounded by walls, which have now disappeared. In 1455 a university was founded at Billom, which passed into the hands of the Jesuits a century later, and was governed by them until the suppression of their order. It has manufactories of fine pottery. Population, 4,266.

**BILLON**, an alloy of copper and silver, in which the copper predominates, and which is used in some

countries for the smaller denominations of money. See Britannica, Vol. XVII, p. 630.

**BILNEY, THOMAS** (c. 1495–1531), an English martyr, born about 1495, probably at Norwich. He studied at Trinity Hall, Cambridge, and was ordained in 1519. He was opposed to the formality of the schoolmen, and denounced saint and relic worship, converting a number of young Cambridge men to his views. In 1527 he was arraigned before Woolsey, and, recanting, was absolved, but was nevertheless confined in the Tower of London for more than a year. Some time after his release, being overcome with remorse for his faithlessness, he began to preach in the fields of Norfolk, but was soon apprehended and condemned; and, although allowed to receive the sacraments of the church, from which he really differed but little, he was burned as a heretic at Norwich, Aug. 19, 1531.

**BILOXI**, a town of Mississippi, on the bay of the same name, situated in Harrison county. It has a railroad, a convent, an iron light-house, and is considered a pleasant summer resort.

**BIMA**, or *Bonjo*, a seaport in Sumbawa, one of the Sunda Isles, in latitude 8° 30' south, and longitude 119° east. It is on a bay of the north coast, being 100 miles to the east of Sumbawa, a town feudally dependent on its sultan. Its chief exports are horses and timber.

**BIMANA** (Latin, "two-handed"), a term first employed by the Göttingen anatomist Blumenbach (1752–1840) to describe the human species alone. The separate order thus designated was recognized by Cuvier and by most of his contemporaries and immediate successors. It has since been shown, however, that man differs less from the anthropoid apes than these apes do from most monkeys, and the term *Bimana* is now rarely used, man being included with apes, monkeys, and lemurs in the old Linnæan order, *Primates*. See Britannica, Vol. XV, p. 444.

**BIMETALLISM**, a term used to denote a double monetary standard of value as fixed by legislative enactment; specifically it is that system of coinage which recognizes either silver or gold coin as legal tender to any amount as a circulating medium and at a fixed relative value. It includes two essential features: (1) an open mint, ready to coin any quantity of either gold or silver which may be brought to it, and (2) the right on the part of the debtor to discharge his liabilities, at his option, in either of the two metals at the established legal ratio. It depends on the possibility of keeping the legal ratio between gold and silver in the bullion market the same. In the ancient world, the ratio of gold to silver in the bimetallic coinage established by Cæsar, and existing down to the time of Alexander, was as 1 to 13.5. In modern times the market ratios have greatly changed in different countries and in different terms of years. In the year 1500 the relative market value of gold and silver was as 1 to 10.75; from 1621 to 1640 it changed to 1 to 14; then, until 1800, fluctuated between this latter value and 1 to 15.27; in 1876 it reached 1 to 17.77; in 1880 it was 1 to 18.06; in 1885 the ratio was 1 to 20.

An international monetary conference was held in Paris in 1878 for the purpose of establishing an international standard of value. A royal commission was appointed in 1886 in England to inquire into the "changes in the relative values of the precious metals," and this commission made its report in 1888. The report was reprinted by the United States Government in 1889. Another international monetary congress was held in Paris in 1889, and in 1890 the United States Congress passed an act empowering the United States Treasury to buy an aggregate amount of 4,500,000 oz. of silver a month, the



highest price paid to be not more than one dollar for 371.25 grains of pure silver, this being the American bimetallic par value at the time. In a few months the price rose 25 per cent. The United States had been hitherto steady exporters of the metal, but exportation received a check. It is possible, should the market value of silver reach the figure established by the above legislative action, that the United States may boldly adopt bimetalism in conjunction with the European nations that are members of the Latin Monetary Union.

**BIMBIA**, a district on the southern slope of the Cameroon Mountains in Africa, and on the northern bank of the river Bimbia. Since 1884 it has been part of the German protectorate.

**BINAB**, a town of Persia, in the province of Azerbijan, beautifully situated on the banks of the Sofi Chai, in the midst of orchards and vineyards, 55 miles south-southwest of Tabriz. The streets are very clean, many of them having a stream of pure water flowing down the center.

**B.NASCO**, a town of Lombardy, 11 miles northwest of Pavia. It is defended by a castle, where, in 1418, Beatrice di Tenda, wife of the Duke Filippo Maria, was beheaded by order of her husband.

**BIN-BIR-KILISA**, the name of extensive ruins in the pashalik of Karamania, Asia Minor, 20 miles north-northwest of Karama. The ruins consist chiefly of the remains of Byzantine churches, evidently of great antiquity, and some of considerable size. It is supposed to be the ancient Lystra, where the cripple was healed by St. Paul.

**BINCHE**, a town of Belgium, on the Haine, 10 miles from Mons. It is well built and walled, with a fine square, ornamented with a fountain. It has manufactories of leather, cutlery, glass, etc., and trade in lace, paper, marble and coal. Population, 5,500.

**BINDRABAN**, a town on the right bank of the Jumna, in the district of Muttra, 823 miles to the northwest of Calcutta, and 92 miles to the south of Delhi. Superstition seems to be the principal business of the place, crowds of pilgrims come from all parts of India, more particularly in honor of Krishna, and through the munificence of wealthy devotees sacred edifices are constantly becoming more numerous and costly. Here, as at Benares, the immediate margin of the river is occupied by flights of steps; these extend for about a mile along the bank, and are constructed of red stone brought from Jeypore, nearly 150 miles distant. Population, 21,550.

**BINGHAMTON**, a prosperous city of New York, county-seat of Broome county, situated on the north branch of the Susquehanna River, at the mouth of the Chenango River, on the Chenango canal, 215 miles northwest of New York. The city is supplied with water from the Susquehanna River by the Holley system. The court-house is a handsome edifice, modeled after St. Paul's in London, and contains a county law library. The New York State Asylum for Inebriates, having failed in the experiment of reforming inebriates, is now used as a State asylum for the chronic insane. The Binghamton Academy, a Roman Catholic academy, parochial school, the Susquehanna Valley Home, a refuge for orphan children, and St. Mary's Home for Indigent Children, are among the educational and charitable institutions. The city was founded by William Bingham in 1787, incorporated as a village in 1818, and became a city in 1867. Population in 1880, 17,317; in 1890, 35,093.

**BINNAACLE**, a wooden box or case, containing a ship's compass together with other apparatus essential to its use. In large ships there are gen-

erally two binnacles, one for the steersman and one for the officer who superintends the steering.

**BINNEY**, HORACE, an eminent lawyer, born at Philadelphia, Pa., Jan. 4, 1780, died there Aug. 12, 1875. He was of English and Scotch descent, and his father had been an army surgeon. He was a Harvard graduate, who won high honors; studied law with Jared Ingersoll; was called to the bar at the age of twenty. In fifteen years he won all the fame and practice he could wish for. He had by this time prepared the volumes which contain the supreme court decisions of Pennsylvania. These volumes are highly esteemed. He was elected to the Twenty-third Congress, and there defended the United States bank. He declined reelection, and retired from active public life. He occasionally gave legal written opinions, and his last notable public services were in regard to the case between Bidal and Girard's executors. Mr. Binney was a famous student, remarkably fond of reading, while, as an orator, he was gifted with a melodious voice and dignified manners. He was a faultless logician, and a powerful advocate.

**BINOCULAR**, a field glass, opera glass, or microscope fitted for the simultaneous use of both eyes. See *Britannica*, Vol. XVI, p. 272.

**BINTURONG**, a genus of quadrupeds, nearly allied to raccoons, from which the chief distinction is in the smaller and less tuberculated back molar teeth. Only two species are known, natives of Malacca, Sumatra, Java, etc. See *Britannica*, Vol. XV, p. 436.

**BIOBIO**, the largest river of Chile. It has a west-northwest course from the Andes to Concepcion on the Pacific, being two miles wide at its mouth, and navigable for boats from the sea to the mountains. Its lower stream separates the province of Concepcion on the north from Independent Araucania on the south.

**BIOGENESIS**, the name used by Huxley for generation in an ordinary sense; the theory that living matter always arises by the agency of pre-existing living matter. Biogenesis is the converse of *abiogenesis*, spontaneous generation.

**BIOGRAPHY**, the representation in continuous narrative of the life and character of a particular individual. It may merely detail the historical sequence of the incidents of a man's life, or it may be an elaborate attempt at an analysis of his character, and at a complete reconstruction of the whole motives of his actions. To the former class mainly belong the ancient examples of biography, as the *Life of Agricola*, by his son-in-law, Tacitus, and the *Lives* ascribed to Cornelius Nepos; while modern biographers have mostly aimed at the latter method. But as the inward life is revealed in the outward, so the most dignified and reticent biography must give some real insight into the character of the man. No little of the interest in ancient and modern histories alike depends on the pictures of men and women with which their pages are lighted up, and when the hasty sketches are by analysts like Livy and Tacitus, we get from them a truer impression than from the most finished biography by a writer of less insight. A biographer may not have the ability to see under the surface the hidden springs of character, and thus understand the relative significance of things, and in proportion as he is wanting in this insight is he liable to give an untrue picture of his subject. Especially is this danger close to him who has to deal with a time or a society in which he himself has not lived; while, in writing modern biographies, he is apt to err by not selecting merely the significant. Of strictly biographical works, the most valuable that has come to us from the ancient Greeks is the

*Lives* of Plutarch, and from Roman literature the *Agricola* of Tacitus. Besides these we have the *Lives* of Cornelius Nepos, the writings of Suetonius, the *Life of Alexander the Great*, by Curtius; *Lives of the Sophists*, by Philostratus, and a *Life of Plato*, by Olympiodorus. Later we have, in ecclesiastical literature, the *Lives of the Fathers*, by Saint Jerome, and numerous biographies of saints, martyrs, etc. In the French and German languages there are many excellent examples of biography. Here it may be enough to mention the names of the authors of those which are among the most valuable: in France, Flechier, Fontenelle, Voltaire, Boissy d'Angelas, Villemain, Cousin; and, in Germany, Schröckh, Herder, Klein, Meissner, Heeren, Luden, Varnhagen von Ense, Barthold, Döring, Pertz, Haym, Arneth, Otto Jahn, Chrysander, Kapp, and Droysen. Some excellent biographies that have been translated into English are Köstlin's *Luther*, Zeller's *Strauss*, Lomenie's *Beaumont*, Duntzer's *Goethe*, Schiller and Lessing. Among English biographies may be especially mentioned Boswell's *Life of Johnson*; Lockhart's *Scott*; Moore's *Byron*; Morley's *Diderot and Rousseau*; Trevelyan's *Macaulay and Fox*; Sir Theodore Martin's *Life of the Prince Consort*; Carlyle's *Frederick the Great*, his *Schiller*, and his *Letters and Speeches of Oliver Cromwell*; Lewes's *Goethe*; Talfourd's *Lamb*; Washington Irving's *Columbus*; Sparks's *Washington*; Helps's *Cortez* and his *Pizarro*, and Froude's *Cæsar*. There are also many excellent universal biographies, such as Chalmers's *Biographical Dictionary*, *Men of the Times*; *Celebrities of the Century*, etc. Other biographical works treat of the lives of certain classes of men, as Vasari's *Lives of Painters, Sculptors and Architects*, and Agnes Strickland's *Lives of the Queens of England*. Others again are for certain countries only, as *Biography Britannica*, Spake's *American Biography*, and Appleton's *Encyclopedia of American Biography*.

**BIOPLASM**, a term introduced by Professor Beale, about 1872, for the germinal matter of living beings as distinguished from formed matter; the state or condition of protoplasm in which it is living and germinating.

**BIPED** (Latin, "two-footed"), a descriptive term, sometimes applied to man, but more frequently to birds. It may be used in reference to habit only, as when animals use only their two hind-limbs for moving along the ground—e. g., man, kangaroo, bird; or it may be used in reference to anatomy, when the typical number of four limbs is reduced to two. Thus among mammals the order of whales (*Cetacea*) is marked by the absence of hind-limbs; among reptiles, some serpents retain traces of hind-legs, and a few lizards have either only hind-feet, or only fore-feet, among amphibians, a few have only fore-feet; and the same is true of numerous fishes and especially of those which live to a large extent in mud.

**BIPENNIS**, a double-headed axe, the weapon which, according to ancient historians and artists, particularly distinguished those fabulous female warriors, the Amazons.

**BIPINNARIA**, the technical name of a starfish larva. It is a curiously-shaped free-swimming form, with two ciliated bands, and with a tendency to develop long, stilt-like arms or processes. It does not directly turn into the adult, but is only its "nurse." The adult is formed within the bipinnaria.

**BIRCH, SAMUEL, LL.D.**, Egyptologist, born in London, Nov. 3, 1813, died there Dec. 27, 1885. He was educated at Merchant Tailors' in 1834, and entered the public service under the commissioners of public records, and in 1836 became assistant in the

archæological department of the British Museum. In this capacity he applied himself with untiring zeal to the study of Greek and Roman antiquities, including numismatics, and to Egyptian hieroglyphics. He assisted Baron Bunsen in the philological portion of *Egypt's Place in Universal History*, the last volume of which, after Bunsen's death, was admirably edited by him. In 1861 he was appointed keeper of the Egyptian and Oriental antiquities, and in 1874 was president of the London Congress of Orientalists. Besides three works connected with his Chinese studies, he was author of *Ancient History from the Monuments of Egypt* (1875), *Egyptian Texts* (1877), and was a contributor to various learned journals.

**BIRD, FREDERICK MAYER**, born in Philadelphia, Pa., June 28, 1838. He was a graduate of the University of Pennsylvania and Union Theological Seminary. He was ordained as Lutheran minister, served as an army chaplain, became a Protestant Episcopal clergyman, and was successively pastor at Spotswood, New Jersey, and South Bethlehem, Pa. He became professor of psychology, Christian evidence, and rhetoric in Lehigh University. He is a writer on hymnology, main editor of the "Lutheran Hymn Book," and possesses the finest library of hymnology in America.

**BIRD, ISABELLA** (Mrs. Bishop), an adventurous lady traveler, long resident in Edinburgh, visited Canada and the United States in 1854, subsequently visiting the Sandwich Islands and Japan. While on her travels, she from time to time sent home letters describing what she saw and did, and from such materials, most of her books have been compiled. Her lively and picturesque narratives of journeys made to the Rocky Mountains, to the aborigines of Yezo, and the shrines of Nihko and Ise in Japan, and the Straits Settlements, have been very popular. Her books are *The Englishwoman in America* (1858), *Six Months Among the Palm Groves of the Sandwich Islands* (1875), *A Lady's Life in the Rocky Mountains* (1879), *Unbeaten Tracks in Japan* (1880), and *The Golden Chersonese* (1883).

**BIRD-BOLT**, a short thick arrow without a point, spreading at the extremity so much as to leave a broad flat surface. Such are to this day used for killing rooks, and are shot from a cross-bow.

**BIRD-CATCHING SPIDER**, a name originally given to a large spider, *Mygale avicularia*, a native of Cayenne and Surinam, but now more extensively applied, being equally appropriate, to a number of large species of *Mygale* and *Epeira*, perhaps also of other genera.

The *Mygale avicularia* is nearly two inches long, very hairy, and almost entirely black; its feet when stretched out, occupy a surface of nearly a foot in diameter. The hooks of its mandibles are strong, conical, and very black. This great spider forms a tube-shaped cell of a fine white semi-transparent tissue, like muslin, in clefts of trees or hollows among rocks; from this it issues only at night to prey upon insects and humming-birds. It is a native of the warm parts of America, the East Indies, and Africa.

**BIRD-CERRY** (*Padus*), a subdivision of the genus *Cerasus*, a tree of 80 to 100 feet in height found from Tennessee to Upper Canada. The wood is compact, fine-grained, takes a fine polish, and is much used by cabinet-makers. The bark is used as a febrifuge, the fruit is not agreeable, but a cordial is made from it by infusion in spirits with sugar, and when dried and bruised it forms an esteemed addition to pemmican.

**BIRD ISLAND**, the northwest island of the Sandwich archipelago, in lat 22° 20' north, and long. 160°



west. It is, as its name implies, a mere haunt of sea-fowl, the links of the chain increasing pretty regularly in size and elevations from Bird Island on the northwest to Hawaii on the south-east.

**BIRD-LICE**, a popular name for lice which infest the plumage of birds. These parasites are louse-like in form, with from three to five jointed antennae, biting mouth organs, and more or less of a sucking mouth. The genera and species are numerous, constituting the greater part of the order *Mallophaga*.

**BIRD-LIME**, an adhesive substance placed on twigs of trees or wire netting for the purpose of catching small birds. A common practice is to place a decoy or tame bird in a cage near where the bird-lime is spread; the wild birds, attracted to the spot by the song of the tame bird, get entangled with the bird-lime.

**BIRD'S-EYE LIMESTONE**, a division of the Trenton group of the Lower Silurians of North America, apparently equivalent to the Llandeilo flags, and containing, besides the remains of brachiopods, many enormous orthoceratites.

**BIRD'S-EYE VIEW**, a term applied generally to modes of perspective, in which the eye is supposed to look down upon the objects from a considerable height. In sketching or drawing a locality, the great difficulty is to represent at the same time the relative heights of mountains and steepness of acclivities. In the 16th century the only kind of views known were of the nature of ground-plans, and the artists of the 17th century tried to combine this method with side views.

**BIRD'S FOOT**, a genus of plants of the natural order *Leguminosae*, deriving both its popular and botanical name from the resemblance of the curved pods to birds' claws; the leaves are pinnate, with a terminal leaflet.

**BIRD'S FOOT TREFOIL** (*Lotus*), a genus of plants of the natural order *Leguminosae*, sub-order *Papilionaceae*. The pods are cylindrical, somewhat spongy within, and imperfectly divided into many cells. The name is derived from the resemblance of the cluster of pods to a bird's foot. The species are very numerous, and are natives of temperate and cold regions. The common bird's foot trefoil (*Lotus corniculatus*) has a stem from six to twelve inches in length, bearing umbellate heads of eight to ten yellow flowers, which have a rich honey-like smell. The leaves have three ovate leaflets like those of the clover, but at the base of each leafstock there are two large leaf-like ovate stipules. The plant is by some regarded as the shamrock of Ireland. It is eaten with great avidity by cattle, and its deeply penetrating roots adapt it well for very dry situations. A species called "winged pea," remarkable for four membranous wings, which run along its pods, a native of the south of Europe, is cultivated for its seeds, which are used as a substitute for coffee.

**BIRD'S NEST**, a name applied to two or more distinct plants, of similarly brownish color and leafless habit, which are root-parasites, and grow more or less concealed under other vegetation. *Neottia nidus-avis*, a British orchid, grows in dark woods, especially beech; *Monotropa hypopitys*, a rare ericaceous plant, grows on the roots of trees in beech or fir woods, the leafless stalks resembling a nest of sticks. There is also a bird's-nest fern, *Asplenium nidus*, so called from the manner in which the fronds grow, leaving a nest-like hollow in the center; and a group of gasteromycete, fungi, the *Nidulariæ*, from their cup-shape and egg-like spore-bearing masses, have also acquired the same popular name.

**BIRDS OF NORTH AMERICA**. See the article *BIRDS Britannica*, Vol. III, pp. 699-778. See also under *DISTRIBUTION*, Vol. VII, pp. 267-90.

**BIRDS OF PREY**, a common title of the order of birds called *Accipitres*. Some birds, however, which do not belong to this order frequently pursue and prey upon other birds. Birds of prey are divided into two sections, *Diurnal* and *Nocturnal*, the latter consisting exclusively of owls, and the former including vultures, falcons and secretory birds or serpent-eaters. See *Britannica*, Vol. XVIII, p. 47.



SECRETARY BIRD.

**BIRETTA**, a square cap worn by the clergy of the Roman Catholic Church, and by some ritualists in the Anglican Church. That of priests is black, of bishops purple, of cardinals red. Originally round, its present form, with straight erect edges, and a tuft or button on the crown, dates only from the seventeenth century; but the low head-covering of English bishops was known as the *birettum* as early as the thirteenth century.

**BIRIOUTCHE**, a town in the government of Voronej, Russia, on the left bank of the Sosna. It is surrounded with earthen ramparts and a ditch, and has four annual fairs. Population, about 4,000. A stream of the same name in its immediate vicinity is noted for its pearl-oysters, and the teeth of elephants are often found exposed on its banks.

**BIRKENFELD**, a German principality belonging to Oldenburg, with which it has been connected since 1817. It has an area of nearly 200 square miles, with a population of 38,685. The capital, Birkenfeld, has a population of 25,000.

**BIRKET-EL-HADJI** ("Lake of the Pilgrims"), a small lake ten miles northeast of Cairo, where the Mecca pilgrims assemble and disband.

**BIRLEY-MAN**, a person who acted as petty officer on an estate, or in a village in Scotland. The duty of this person was to keep order, and attend to the interests of the proprietor. The office is now nearly extinct.

**BIRMINGHAM**, a city of Alabama, and county-seat of Jefferson county, situated nearly in the center of the State, in a beautiful valley 600 feet above the level of the sea. The streets are broad, well paved, lined with shade trees, and well lighted. The court-house is a magnificent structure, and all the public buildings are erected in a substantial manner, as also are the churches, school-houses and hotels. Howard College (Baptist) is located at East Lake, near by. The United Charities have an infirmary costing \$100,000. Birmingham is located in the center of the richest coal and iron region in the State, and blast furnaces and rolling mills are numerous, some of them being large structures, and affording facilities for an immense and rapidly growing manufacturing business. The Henderson Steel Manufacturing Company is making good steel from the red ores found in the vicinity, and have recently completed a large blast furnace with a capacity of seventy tons daily. There were in 1890 three through lines of railway—three other railways having their termini in the city; while still three other roads were in process of construction, thus providing ample communication in all directions. In addition to the iron industry there are numerous manufactories, employing a large mechanical force. The recent growth of the city in population has been remarkable, the census

of 1880 showing an enumeration of but 3,886, while in 1890 there were 26,241.

**BIRMINGHAM**, a borough of New Haven county, Conn., situated on the Housatonic River, at the mouth of the Naugatuck, about ten miles west of New Haven. The first pin manufactory established in America is located here, and there are extensive manufactories of chains, augers, axles, springs, corsets, skirts, stockings, paper, silver-plate, and a number of rolling-mills and foundries.

**BIRNAM**, a hill 1,580 feet high, in the east of Perthshire, Scotland, twelve miles northwest of Dunsinnan hill. It commands a fine view of the valley of the Tay. It was once covered by part of an ancient royal forest. Shakespeare has immortalized Birnam wood in his tragedy of *Macbeth*.

**BIRNEE**, Old and New, the name of two towns of Bornu, Central Africa. Old Birnee, which was formerly the chief city of the empire, walled and of vast extent, is situated on the banks of the Yeu, seventy miles northwest of the modern capital, Kuka, and seventy-five miles west of Lake Tsad. It is now greatly deserted and decayed, but has still a population of about 10,000. New Birnee, about twenty miles south of Kuka, is walled and has a large mud palace. Population, 10,000.

**BIRNEY**, DAVID BELL, son of James G., born at Huntsville, Ala., May 29, 1825, died at Philadelphia, Pa., Oct. 18, 1864. He studied law in Cincinnati, and practiced in Philadelphia; entered the Union army and rose to the rank of major-general.

**BIRNEY**, JAMES GILLESPIE, born at Danville, Ky., Feb. 4, 1792, died at Perth Amboy, N. J., Nov. 24, 1857. He graduated from Princeton in 1810. He served in the Kentucky and afterwards in the Alabama legislature; was repeatedly elected mayor of Huntsville, Ala.; was interested in all educational projects in his State; was long the adviser of the Cherokee Nation. Being opposed to slavery and a warm advocate of his views thereon, he emancipated his slaves, having previously removed to Kentucky. Mob violence necessitated his leaving here and going to Cincinnati, Ohio. He published the "Philanthropist," but in 1836 his office was entered by a mob and his presses thrown into the river. He went to live in New York city after this, and served the American Anti-Slavery Society as secretary. He was the presidential nominee of the Liberty Party in 1840, and again four years later. Mr. Birney was the author of many books on the subject of slavery.

**BIRNEY**, JAMES GILLESPIE, a grandson of James G., senior; was an officer in the civil war, and served under Sherman and Custer. He died soon after the war.

**BIRSE**, a small but famous affluent of the Rhine. It rises in Berne, Switzerland, flows through Münstertal, and enters the Rhine near Basel. At St. Jacob, the "Swiss Thermopylae" about two miles from that city, 1,500 Swiss died fighting the French in 1444, and in July, 1449, near the village of Dornbach about a mile and a half south of Basel, 6,000 Swiss gained a victory over 15,000 Austrians.

**BIRN**, **BEROO**, or **BEEROO**, a kingdom of Soudan, Western Africa, bounded on the north by the Sahara, on the east by the Niger, and having Bambarra on the south.

**BIS**, in music, denotes that the passage over which it is placed is to be played twice. Such passages generally have a slur over them and the "bis" written below it.

**BISACQUINO**, or **BUSACCHINO**, a town of Sicily, about twenty-seven miles south of Palermo. Population, 9,000.

**BISALNAGAR**, a town of India, in the Guicowar of Baroda's territories, 220 miles northwest of

Mhow. It has a large transit-trade, and manufactures cotton cloths. Population, 20,000.

**BISALPUR**, a town of India, in the North-west Provinces, twenty-four miles east of Bareilly. Population, 9,000.

**BISCACHA**. See **VISCACHA**, in these Revisions and Additions.

**BISCAYNE**, a village of Florida, on Biscayne Bay, in Dade county, overlooking the Atlantic. It is noted for its delightful climate and the healthfulness of its situation.

**BISCHOFF**, THEODOR LUDWIG WILHELM, anatomist and physiologist, born at Hanover, Oct. 28, 1807, died Dec. 5, 1882. He studied at Bonn and Heidelberg, becoming in 1836 extraordinary professor, and in 1843 ordinary professor of anatomy and physiology at Heidelberg. From 1844 to 1855 he filled the same chair at Giessen, where he founded a physiological institute and anatomical theater, and from 1855 to 1878 at Munich. Bischoff's studies were mainly in embryology and biology, and he left numerous treatises and papers of great value.

**BISCUIT**, in pottery, the term applied to porcelain and other earthenware after the first firing, and before it has received the glaze and embellishments. In this condition, the ware is very porous, adheres to the tongue when placed upon it, and allows water very slowly to percolate through its pores. The unglazed bottles employed in cooling water and the common flower-pot are examples of biscuit-ware. See *Britannica*, Vol. XIX, p. 601.

**BISHOP**, a beverage composed of red wine, poured warm or cold, over ripe bitter oranges, sugared and spiced to taste, the quality depending upon the excellence of the wine employed. If white wine is used the beverage is called *cardinal*, and with Tokay it becomes *pope*.

**BISHOP-AUCKLAND**, a small town in the middle of the county of Durham, England. It contains the abbey-like palace of the Bishop of Durham.

**BISHOP**, MADAM ANNA, a famous concert singer, born in London, England, in 1814, died in New York in 1884. She possessed a soprano voice of unusual power, and sang in nearly all the countries on the globe, retaining her voice until 1868, when she retired from the stage. Her first husband was Sir Henry Rowley Bishop, to whom she was married in 1831. Leaving him in 1835 she contracted an alliance with her Italian music teacher, named Boscha, and after his death in 1855, became the wife of an American merchant, Martin Schultz. Her father's name was Rivière.

**BISHOP'S CASTLE**, a town in the southwest of Shropshire, nineteen miles southwest of Shrewsbury. It is irregularly built on a hill slope. The bishops of Hereford had formerly a castle here, now destroyed. During the civil wars of the seventeenth century, the inhabitants took shelter in the church, which was demolished over their heads. Population, 2,200.

**BISHOP-WEED** (*Egopodium podagraria*), an umbelliferous weed, exceedingly difficult of extirpation on account of its creeping rhizomes. It is eaten by cattle, and the leaf-stalks were formerly boiled and eaten as greens. In the United States the name is applied to a somewhat similar umbelliferous plant, *Discopleura capillacea*.

**BISIGNANO**, a town of Italy in the province of Cosenza. It has a cathedral, a castle and a trade in silk, and gives the title of prince to the existing branch of the Sanseverino family. Population, 4,097.

**BISLEY**, a town of Gloucestershire, eleven miles southeast of Gloucester. The church contains some interesting monuments, a cross-legged knight in



armor, and an ancient stone font. The canal uniting the Severn and the Thames passes through the town. The chief manufacture is coarse clothing. Population, 2,000.

BISMARCK, a city of North Dakota, capital of the State and county-seat of Burleigh county, situated on the Missouri River, about sixty miles north of the southern boundary of the State. The situation of the city is a delightful one, commanding charming views of the Missouri valley and the surrounding region. The principal buildings are the capitol, built upon an eminence in the northern part of the city, the penitentiary, the court-house, and a fine public school-house. A bridge which cost a million and a half of dollars here crosses the river, which is navigable for more than a thousand miles above Bismarck. The chief industries, besides the shipping of immense quantities of freight, are manufactures of flour and of malt-products. Bismarck is the center of trade of a region rich in wheat, oats and potatoes.

BISMARCK-SCHÖNHUSEN, OTTO EDWARD LEOPOLD, PRINCE VON, ex-chancellor of the German empire, and foremost of statesmen, was born April 1, 1815, at Schönhausen in Brandenburg, of an old family, of which various members gained reputation both as soldiers and as statesmen. He received his University education at Göttingen, Berlin and Griefswald, where he studied law and agriculture, but became more distinguished as a swordsman than as a reading man. After finishing his studies he lived for a time on his estates. Before 1847 he was little heard of, but about that time he began to attract attention in the new Prussian parliament as an ultra-royalist.

Bismarck's diplomatic career commenced in 1851, when he was appointed Prussian member of the resuscitated German diet of Frankfurt. Here he began to manifest that zeal for the interests and aggrandizement of Prussia which afterwards undeviatingly guided him, and openly expressed discontent with the predominance of Austria. He remained at Frankfurt till 1859, when he was recalled from the diet and sent as minister to St. Petersburg. In the spring of 1862 he was transferred to Paris. During his short official stay there he visited London, and met the leading politicians of the time. In the autumn, when the king's government could not obtain the consent of the lower house to the new and expensive military organization, Bismarck was recalled to take the portfolio of the ministry for foreign affairs, and the presidency of the cabinet. Being unable to pass the reorganization bill and the budget, he closed the chambers, announcing that the government would do without the sanction of the deputies. See *Britannica*, Vol. XX, pp. 12, 13. The army reorganization went on; and the next four sessions of parliament, refusing their sanction, were dissolved in the same way.

At the death of the king of Denmark Bismarck was adroit enough to aggrandize Prussia by the acquisition of the Elbe duchies, and reconciled his opponents to his high-handed policy by pointing to this success of the newly-modeled army. Throughout the events which ended in the humiliation of Austria at the battle of Königgrätz (1866), and the reorganization of Germany under the leadership of Prussia, Bismarck was the guiding spirit, and through this success, from being universally disliked, he became the most popular man in Germany.

The action of France in regard to the candidature of Prince Leopold of Hohenzollern for the throne of Spain gave Bismarck the opportunity of carrying into action the intensified feeling of unity

among Germans. During the Franco-German war of 1870-71 he was the spokesman of Germany; he it was who, in February, 1871, dictated the terms of peace to France.

Having been made a count in 1866, Bismarck was now created prince and chancellor of the German empire. After the peace of Frankfurt (May 10, 1871), the aim of his policy, domestic and foreign, was to consolidate the young empire of his own creating by rendering its institutions more beneficent, authoritative, homogenous and stable, and to secure it, through alliance and political combinations against attack from without. Thus, conceiving the authority of the government to be endangered by the Church of Rome and its doctrines, he embarked on a long and bitter struggle with the Vatican. But he had underrated the resisting power of the Romish Church, and motives of political expediency finally led him to modify his policy.

Among the more important measures by which Bismarck's domestic policy was marked are a reformed coinage, a codification of law, a nationalization of the Prussian railways, fiscal reform in the direction of making the empire self-supporting (independent of "matricular contributions" from its component states), repeated increase of the army and the regular voting of its estimates for seven years at a time, and the introduction of a protective tariff (1879). He attempted to combat social democracy by means of economic experiments, which caused him to be called the greatest state socialist of the age.

In 1884 Bismarck inaugurated the career of Germany as a colonizing power, which brought him into temporary conflict with the England of Mr. Gladstone. For the rest, his foreign policy was mainly aimed at isolating France and rendering her incapable of forming anti-German alliances, while, on the other hand, he gradually combined the central powers of Europe into a peace-league; aiming at counteracting the aggressiveness of Russia and France, separately or combined, on the Danube or the Rhine. In 1885 Bismarck's 70th birthday was celebrated as a great national event.

The resignation by Prince Bismarck of his office as Prussian Prime Minister as well as chancellor was announced in February, 1890, but did not actually occur till March 17, when divergences of opinion between him and the Emperor, William II led to his retirement. His departure from Berlin on the 29th was made the occasion of a great popular demonstration in his favor. The ex-chancellor has since resided chiefly at his country residence. It has recently been reported that he had been offered, and would probably accept, a seat in the Reichstag, but at the present writing (March, 1891) reports have not been confirmed.

BISON. (See *Britannica*, Vol. III, p. 792.) The name buffalo, which is incorrectly applied in the United States to the American bison, belongs properly to two species of ruminants of the family *Bovidae*, one of which is used as a beast of burden in India and Italy, the other being a dangerous, untamable native of South Africa. The *Bison Americanus* is a species of the ox family, and is indigenous to America. It differs from the buffalo in having a hump upon its back, in having no dewlap, in having its horns turned inward, and in having cavities in the horns communicating with the nasal passages.

BISSAGOS, or BIJUGA ISLANDS, a group of small volcanic islands off the west coast of Africa, opposite the mouth of the Rio Grande. Many of the islands appear to be thickly settled by a savage, thievish, negro race, who cultivate maize, bananas,

and palms, and feed cattle and goats, which constitute their chief wealth. Bassao, one of the group, on which there is a Portuguese settlement, has a population of 8,000. It carries on a large trade in slaves, also in rice, wax, hides, etc. See *Britannica*, Vol. XXI, p. 661.

**BISSEN, WILHELM**, a Danish sculptor, born near Schleswig in 1798, died in 1868. He studied for 10 years in Rome, 1823 to 1833, under Thorwaldsen, and in 1841 returned to that city to execute a government, commission, and produced a *Venus and Cupid Sharpening His Arrows*, that are among his masterpieces. By his will Thorwaldsen appointed Bissen to complete his unfinished works and have charge of his museum. In 1850 he became director of the Academy of Art in Copenhagen. See *Britannica*, Vol. XXI, p. 570.

**BISTORT**, a perennial herbaceous plant of the genus *Polygonum*, of the natural order *Polygonaceæ*. It is from one to two feet high, with a simple stem, ovate subcordate leaves, and one dense terminal cylindrical spiked raceme of flesh-colored flowers. The root is one of the strongest vegetable astringents.

**BISTRE**, a pigment of a warm brown color prepared from the soot of wood, especially beech. It is used in water-colors after the manner of India ink.

**BISTRITZ**, a fortified town of Northeast Transylvania, beautifully situated on the Bistritz River, in a fine valley. In its vicinity are the remains of an ancient castle, once the residence of the illustrious Hunyads. It has several large cattle fairs, but the extensive general trade it once carried on is now entirely gone. Forming, as it does, the last strong position in the northeast of Transylvania, it was repeatedly the scene of hot strife between the Hungarian and Austrian generals, in 1848 and 1849. Population, 7,312.

**BIT**, or **BITT**, in ship-building, a frame composed chiefly of two short, strong, vertical timbers, fixed into or upon the deck in the forepart of the vessel. Its main purpose is for fastening the cable when the ship rides at anchor, and for "leading" the principal ropes for the rigging. To "bit the cable" is to fasten it round the bit. There are various kinds of bits—"riding-bits" "jeer-bits," etc. Having to resist great strains, the bits are strongly bolted to the beams that support the deck.

**BITHOOR**, a town in India, in the district of Cawnpore, and sub-presidency of North-west Provinces, situated on the right bank of the Ganges. It is particularly devoted to the worship of Brahma; has numerous pagodas, and is, of course, a favorite resort for pilgrims, who here, as at Benares and Ben-draban, have by means of elaborately constructed ghauts access to the sacred stream for purposes of ablution. During the mutiny of 1857 Bithoor acquired an unenviable notoriety as the stronghold of Nana Sahib. Population, 9,000.

**BITTER KING**, a small tree or shrub of the natural order *Simarubaceæ*, which has received its name from its intense bitterness. It is a native of the Indian archipelago, and is used as a febrifuge and tonic.

**BITTERN**, or **SALT OIL**, an oily liquid obtained during the preparation of common salt—the residue when salt water has been boiled and the salt precipitated—and from it Epsom salts and other compounds of magnesia are procured.

**BITTER ROOT RIVER**, a stream 110 miles long in Montana. It is a branch of Clarke's River. Gold is found near the Bitter Root.

**BITTER SPAR**, a name given to dolomite from the magnesia contained in it, which the Germans call bitter salt.

**BITTER-SWEET**, or **WOODY NIGHTSHADE**. See *NIGHTSHADE*, *Britannica*, Vol. XVII, p. 499.

**BITTERWOOD**, a tree of the natural order *Simarubaceæ*, a native of Jamaica. The wood is used in medicine for the same purpose as quassia. The name is also given to species of the genus *Xylopia*, remarkable for the bitterness of their wood.

**BITUMINOUS COAL**, a term applied to the varieties of coal which contain a large quantity of gas, and burn with a smoky flame.

**BITUMINOUS LIMESTONES**, limestones impregnated and sometimes deeply colored with bituminous matter, obtained from decaying vegetable matter, or from the decomposed remains of those animals whose hard parts form so large an amount of the rock.

**BITUMINOUS SHALES**, indurated beds of clay occurring in the coal measures and containing such an amount of carbon and volatile matter that they are able to keep up combustion when mixed with but a little coal. They are, indeed, impure coal, with a large percentage of ash or earthy matter, which after burning retains the original form.

**BIVOUC**, the encampment of soldiers in the open air, without tents where every one remains dressed, and with his weapons by him. Even during the Seven Years' War it was no uncommon thing for the whole army, when in the vicinity of the enemy, to pass the night in their ranks, each lying down in his place, in order to be ready to stand to their arms at a moment's notice; but the French revolutionary army introduced the practice of dispensing with tents altogether, and regularly passing the night *en bivouac*. From this source originated the rapidity in their motion, which made them successful for a long time, and the practice was afterwards initiated by other armies of Europe. Soldiers in bivouac light fires, and improvise, where it is possible, huts of straw, branches, etc. But this mode of encampment, though favorable to celerity of movement, is purchased at the expense of the soldiers' health, besides being destructive of discipline by leading to plundering houses, fruit trees, etc., in the vicinity, and is now almost wholly dispensed with; for permanent encampment regularly constructed wooden huts have been introduced.

**BJELA**, a town in the Russian-Polish government of Siedlce, on the Krzna River. It has considerable trade in corn. Population, 19,500.

**BJÖRNSEN, BJÖRNSTIERNE**, a Norwegian writer, born Dec. 8, 1832, at Kvikne, in Osterdalen, where his father was pastor. After studying at the University of Christiania from 1852, and then for a year at Copenhagen, he returned to Norway in 1857, and published his *Synnöve Solbakken*, which at once attracted great attention. Immediately afterwards he was appointed manager of the Bergen Theater by its proprietor, Ole Bull, and in 1858 he published the tale *Arne* and the drama *Halte-Hulda*. In 1859 he left Bergen to become editor of the *Aftenbladet* at Christiania, but becoming involved in violent controversies he withdrew the next year to Copenhagen, where he published a number of shorter tales and the drama, *Mellum Slagene*. From 1860 to 1862 he resided in Rome, continuing his literary work, and on his return to Norway he was awarded a yearly pension by the Storting. In the next two years he produced two plays, at the same time editing the *Norsk Folkeblad*. He again lived abroad from 1872 to 1876, when he returned to Norway and remained for some years. Holding the highest place in popular favor as a political orator, Björnson took an active part in the movement which led to the victory of parliamentary government in Norway. Though



he settled in Paris in 1883, he still made his influence felt in Norwegian politics. A number of his tales have been translated into English and German, and several of his plays have secured a footing on the German stage. Both as poet and novelist Björnster stands in the first rank among living Scandinavian writers. He has written numerous pamphlets on political and religious questions of the day. See *Britannica*, Vol. XVII, pp. 591, 592.

BJÖRNSTJERNA (Magnus Friedrich Ferdinand), Count (1779-1847), a Swedish statesman and author, born at Dresden in 1779. He was educated in Germany, and entered Sweden for the first time in 1793, to join the army, and in 1813 he was appointed lieutenant. In 1826 he received the title of count, and in 1828 was appointed ambassador to the court of Great Britain, which office he held till 1846, when he returned to Stockholm, where he died in 1847. As a politician his opinions were liberal. In addition to some political writings he published in 1843 a work on the *Theogony, Philosophy and Cosmogony of the Hindus*.

BLACK, ADAM, publisher, born in Edinburgh, Feb. 20, 1784, died Jan. 24, 1874. He was trained as a bookseller in his native city and in London. Forming a partnership with a nephew, he established the Edinburgh business of Adam and Charles Black. The firm gained position and fortune chiefly through the purchase of the copyright of the *Encyclopædia Britannica* in 1827, after Constable's failure; and that of Scott's novels from Cadell's representatives in 1851. A seventh and eighth edition of the *Britannica* was issued during Black's business connection with the firm, while Scott's novels had a large and steady sale. Black was a prominent and useful citizen of Edinburgh; was twice lord-provost, and was Liberal M. P. for Edinburgh (1856-65). A statue was erected at Edinburgh in 1877, in recognition of his services.

BLACK, JAMES, born at Lewisburg, Pa., Sept. 23, 1823. He is a lawyer and an earnest laborer for temperance, and was the first presidential nominee of the prohibition party (1872).

BLACK, JEREMIAH SULLIVAN, born in the Glades, Somerset, county, Pa., Jan. 10, 1810, died at York, Pa., Aug. 19, 1883. He was not a college graduate, but after studying in the common schools he took up the profession of law, and after eleven years was made judge. He was a Jeffersonian Democrat, was president-judge of his district for nine years, and was elected one of the supreme court judges of Pennsylvania in 1851 and again in 1854. James Buchanan, when he became president, chose Judge Black as attorney-general. He performed important duties while holding this office; he protected the government from unjust claimants of land grants in California, and held the opinion (1860-61) that the government had the right to put down insurrection. As Buchanan believed the government had no coercive power, the attorney-general was placed in a trying situation, as he endeavored to save the government from the secessionists. During the latter part of Buchanan's administration, Judge Black was Secretary of State (filling the vacancy of Gen. Cass, resigned), and Edwin M. Stanton held Black's former office. In 1861 he retired from public life. He was engaged in several prominent lawsuits, such as the Vanderbilt will contest and the McGarrahan claim.

BLACK, JOHN, an eminent newspaper editor, and classical scholar of some reputation, born in Berwickshire in 1783, died in 1855. Left an orphan at the age of twelve, he commenced life in the office of a writer, but soon left that place for Edinburgh, where he became a writer's clerk. While in this capacity he was assiduous in the work of self-education; he acquired German from a German musician, and Italian from a refugee. In 1810 he went to London, and was engaged as a parliamentary reporter for the "Morning Chronicle," of which paper he afterwards became editor. He retired from the editorship in 1843.

BLACK, WILLIAM, a Scotch novelist, born in Glasgow in 1841. He began his career as a journalist. He was special correspondent of the "London Star" during the war between Prussia and Austria in 1866, and was subsequently assistant editor of the "London News." The work by which he became known as an author of established reputation was *A Daughter of Heth*, published in 1871. *A Princess of Thule* (1873) is perhaps the best of his numerous works. In 1874 he abandoned journalism, and in 1876 he visited America. During 1888 he wrote for "Harper's Magazine." At the present writing, 1891, his most recent work is *The New Prince Fortunatus*.

BLACK ACTS, the acts of the Scottish parliament of the first five Jameses, those of Queen Mary's reign, and of James VI down to 1587. They were called the black acts because they were all printed in the black or Saxon characters.

BLACK ASSIZE, the common name of an extraordinary and fatal pestilence which broke out at Oxford at the close of the assizes 1577, immediately after the passing of sentence on Richard Jencks, condemned to lose his ears. It was supposed to be a Divine judgment on the cruelty of the sentence; but it is satisfactorily explained by the pestilential atmosphere of the adjoining jail, then, as it was long after, a place of misery, filth, and disease. From July 6 to Aug. 12, 510 persons died in Oxford and the neighborhood of this dreadful malady, among whom were the chief officials who sat on the assize, most of the jury, and many members of the University. Women, children, physicians, poor people, and visitors are said to have escaped the infection.

BLACK-BAND IRONSTONE, an ore of iron found very extensively in Scotland and elsewhere. It occurs in the Carboniferous system in regular bands, layers, or strata, and generally associated with coal and limestone. It is mainly a carbonate of iron, accompanied by much coaly matter, and can be easily reduced. See *Britannica*, Vol. XIII, p. 285.

BLACK BEETLE, a popular name for the common cockroach of Great Britain. The term is also applied to a great family of beetles known as *Melanomata* in the heteromorous suborder of *Coloptera*.

BLACKBERRY, a name common to several roseaceous plants of the genus *Rubus*, and to their fruit which consists of many small juicy drupelets, which unlike those of the raspberry, fall off with their receptacle. Several varieties of blackberry are extensively cultivated in the United States. The roots of the high-blackberry, *Rubus villosus*, and of the low-blackberry or dewberry, *Rubus canadensis*, are much used in medicine as a tonic astringent.

BLACK BOOK, a collection of English admiralty law in the 14th century, first edited by Sir Travers Twiss (four volumes, 1871-76). It indicates the pretensions of the civil law as regards trial without jury, torture, etc., which afterwards led to legislation in vindication of the position of the common-law courts. *Black Book* is also a usual term for the reports presented to parliament in 1536, on which the legislation for the dissolution of the monasteries and the secularizing of their revenues proceeded. These reports probably never existed as a book. A list of habitual criminals, first published in 1877, has been also so called. See *Britannica*, Vol. I, p. 157; Vol. XXI, p. 584.

**BLACK-BULLY**, or **SAPODILLA**, *Achras Sapota*, a large South American tree, belonging to the *Sapotaceæ*. It is cultivated for its fruit, the sapodilla or sapodilla-plum. Its wood, which is of a reddish-brown color, and very durable, is used for ship-building.

**BLACKBURNIE**, **FRANCIS**, Lord Chancellor of Ireland, born at Great Footstown, County Meath, Nov. 11, 1782, died Sept. 17, 1867. In 1798 he entered Trinity College, Dublin. Called to the English bar in 1805, and to that of Ireland in 1822, he was appointed attorney-general for Ireland in 1830, and again in 1841, master of the rolls in 1842, chief justice of the Queen's Bench in 1846, and lord chancellor of Ireland in 1852 and 1866. He thus served under both Whig and Tory governments, and was brought into close connection with the leading politicians on either side; while at different times he had the duties imposed on him of prosecuting O'Connell, and judging Smith O'Brien. In 1867 he declined an offer of a baronetcy.

**BLACK CAP**, the cap worn by English judges as a part of full dress, and so put on by them when a prisoner is condemned to death.

**BLACKCAP**, **BLACKCAP WARBLER**, or **BLACKCAP FAUVETTE** (*Sylvia atricapilla*), a bird of the great family of the *Sylviadæ*, or *Warblers*. It is regarded as the sweetest song-bird in Britain, or indeed in Europe, except the nightingale; it is a rather smaller bird than the nightingale; the general color is gray, with an olive tinge above and becoming white below; the upper part of the head is black, and the feathers somewhat erected, giving the bird a hooded appearance. In Britain the blackcap is only a bird of passage, though it extends its migrations as far north as Lapland. In the South of Europe it is found both in summer and winter. See *Britannica*, Vol. XXIV, p. 553.

**BLACK CHALK**, various kinds of clay-slate, containing a considerable proportion of carbon. It is used for drawing, and is also ground down to form a black paint. It is found as a rock of slaty texture and bluish-black color in the island of Islay and in Caernarvonshire; also in Spain.

**BLACK DEATH**. See **PLAGUE**, *Britannica*, Vol. XIX, p. 164.

**BLACK DRAUGHT**, a popular purgative medicine, consisting of an infusion of senna with sulphate of magnesia.

**BLACK EARTH** (*Tchernozem* of Russian geologists), the name given to a deposit which covers vast areas in southern Russia. It closely resembles the *löss* of Central Europe in texture and structure, and bears the same relation to the glacial accumulations of Russia that the *löss* of the Rhine, the Danube, etc., does to those of Central Europe. It is probably the fine-grained silt derived from the torrents that escaped from the melting snows and glaciers of the Glacial period. It varies in color from dark brown to black, and in thickness from a foot or two up to six or seven yards, occasionally reaching, it is said, even to 60 feet.

**BLACKFEET INDIANS**, a tribe of North American Indians, the most western division of the Algonquin stock. See **INDIANS**, **AMERICAN**, in these *Revisions and Additions*.

**BLACKFISH**, a fish of the family of the *Scomberidæ*, very nearly allied to the beautiful *Coryphænes*, so frequently called dolphins. It is found in the Mediterranean Sea and on the western coasts of Europe. It is 30 inches in length, weighs about 14 pounds and has a single elongated dorsal fin with short rays rising from a thin elevated ridge; the skin is tough and can be stripped off like that of an eel. The blackfish, or the *Tautogaonitis*, found along the American coast, is highly esteemed

for the table. A species of whale is also called blackfish. See *Britannica* Vol. XXIV, p. 686.

**BLACK FLUX** is prepared by heating in a covered crucible ordinary or crude cream of tartar, or the bitartrate of potash, when the tartaric acid is decomposed and charred, forming carbonic acid, which remains in combination with the potash as carbonate of potash, accompanied by much free carbon. This very intimate mixture of carbonate of potash and carbon is a fine black powder of great service in the fluxing of metallic ores, as of lead, and the separation of the metal therefrom. The black flux is likewise employed as the raw material from which, on the application of heat in iron vessels, the metal potassium can be obtained.

**BLACK FRIARS**, friars of the Dominican order. The old Dominican monastery in London, dating from 1276, stood near the north end of Blackfriars Bridge.

**BLACK FRIDAY**, any Friday marked by a great calamity. In England it has especial reference to Dec. 6, 1745, as being the day on which news was received in London that the young pretender, Charles Edward, had reached Derby; or to May 11, 1866, from a commercial panic then at its height, caused by the stoppage of Overend, Gurney & Co., London. In the United States it has reference to the financial panic caused by speculation in gold in the city of New York, Sept. 24, 1869; or to a similar panic, which began Sept. 18, 1873.

**BLACKGUARD**, a term used in the 16th century for the lowest menials of a noble house—the scullions who cleaned pots and pans. It was also used of the hangers-on of an army, camp-followers, then a rabble, and now used of vagabonds in general.

**BLACK HAWK**, a noted chief of the Sac and Fox Indian tribes, born in 1767 at Kaskaskia, Ill., died at his camp on the Des Moines River, Oct. 3, 1838. Black Hawk and 500 warriors joined the British in the war of 1812. When the main body of the two tribes removed to the western bank of the Mississippi, Black Hawk and his followers refused to go, although their lands had been given to the whites by treaty. After considerable trouble the Indians began to massacre the settlers, and a United States force was sent out to conquer them. On Aug. 2, 1832, Black Hawk was obliged to surrender.

**BLACK HILLS**, a group of mountains in South Dakota and Wyoming Territory. Laramie Peak, the highest in the range, rises 8,000 feet above sea level. This region being fertile, well wooded and watered, is adapted to dairying, but the mountains are most noted for their gold, limestone, lead and tin.

**BLACKHEATH**, an open common in the county of Kent, five miles southeast of London. It commands a fine view of great extent, and being a healthy tract many villas have been built on its margin. It is a favorite holiday resort for Londoners. It is one of the few places where the ancient Scottish game of golf is practiced. Here the Danes encamped in 1011, and the Londoners welcomed Henry V from Agincourt.

**BLACK HOLE**, a name given to a dungeon or dark cell in a prison, but especially associated with an apartment known as the "Black Hole of Calcutta," where, in 1756, a party of English were confined in the most cruel manner. The garrison of the fort connected with the English factory at Calcutta having been captured by the Nabob Suraja Dowlah, this barbarian caused the prisoners, 146 in number, to be confined in a cell 20 feet square, which had only two small windows, and these were obstructed by a veranda. The crush of the sufferers was dreadful, and after a night of agony from pressure, heat, thirst, and want of air,



there were in the morning only 23 survivors. See *Britannica*, Vol. IV, p. 656; Vol. XII, p. 801.

**BLACKIE**, JOHN STUART, a Scottish writer, born in Glasgow in 1809. He was educated at Aberdeen and Edinburgh, and in 1829 went to the Continent, where he continued his studies at Göttingen and Berlin, and afterwards at Rome. In 1834 he published a good metrical translation of Goethe's *Faust*, and in the same year passed as advocate at the Edinburgh bar. But he was more interested in literary pursuits than in the practice of his profession, and soon became known by his articles on German subjects contributed to the magazines of the time. In 1841 he was appointed to the chair of Humanity in Marischal College, Aberdeen, which he held until 1852, when he was elected to the Greek chair in the University of Edinburgh. After he became professor he took an active part in promoting educational reform, and in the movement that led in 1859 to the remodeling of the Scottish Universities. He always figured as a patriotic champion of Scottish nationality and its characteristic features. During the years of 1874-76 he advocated throughout the country with great enthusiasm the foundation of a Celtic chair in Edinburgh University, and was successful in raising a large sum for its endowment. He resigned his chair in 1882. He published a fine verse translation of Æschylus in 1850, another of the *Iliad* in ballad meter in 1866, as well as several volumes of verse. His prose works embrace moral and religious philosophy, the method of history, the land laws and a short life of Burns (1885). His principal philological papers were collected in *Horæ Hellenicæ* (1874). In the same year he published *Self-Culture*.

**BLACKING**, the material employed for producing a black, glazed, shining surface on leather. The main ingredient in various kinds of blacking is bone-black, which is mixed with oil, raw sugar or molasses, and a little sulphuric acid.

**BLACK ISLE** is a common name for the peninsula, in Easter Ross, lying between the Beaulieu and Moray Firths and Cromarty Firth. See *Ross*, *Britannica*, Vol. XX, p. 854.

**BLACK JACK**, a name given by miners to blende. It was also in former times the name applied to a kind of drinking flagon.

**BLACK LEAD**, the popular name of graphite, or plumbago, a mineral consisting chiefly of carbon. See *CARBON*, *Britannica*, Vol. V, pp. 86, 87.

**BLACK LETTER**, a name now commonly applied to the Gothic or Old English letter, which was introduced into England about the middle of the 14th century. See *TYPOGRAPHY, GOTHIC*, *Britannica*, Vol. XXIII, p. 694.

**BLACK LIST**, a name applied to printed lists connected with insolvency, bankruptcy, and other matters affecting the credit of firms and individuals, and which are circulated for the private guidance of the mercantile community, with a view of affording protection against bad debts, frauds, etc. The term is also frequently used of any list of persons who are deemed objectionable by the makers or users of the list.

**BLACKMAIL**, a rent or tribute formerly exacted by freebooting chiefs from the people in the Border counties of England and Scotland, and along the Highland border. It was a kind of compromise with robbers, and bought immunity from the attacks not only of those to whom it was paid, but also of others. It continued to be exacted along the Highland border until about the middle of the 18th century. The term is now applied to extortion of any kind by intimidation. It usually implies involuntary payment of money through fear of threatened injury to reputation.

**BLACK MONDAY**, Easter Monday, April 14, 1360, so called from the extraordinary darkness and the fatally bitter cold. Stow, in his *Annals* says: "The 14 day of April and the morrow after Easter day, King Edward (III) with his host lay before the city of Paris, which day was full darke of mist and haile and so bitter cold that many men dyed on their horses with cold; wherefore unto this day it hath bene called the *Blacke Munday*."

**BLACKMORE**, RICHARD DODDRIDGE, an English novelist, born at Longworth, Berkshire, in 1825. Educated at Blundell's School (Tiverton), and Exeter College, Oxford, he subsequently studied law, was called to the bar in 1852, and practiced for a time as a conveyancer. His first publications were *Poems by Melancton* (1854), *Epulhia* (1855), *The Bugle of the Black Sea* (1855), followed by *The Fate of Franklin* (1860), and a translation of the first and second books of Virgil's *Georgics* (1862). Other volumes of verse have followed these, as well as a complete translation of the *Georgics* in 1871. His first novels were: *Clara Vaughn* (1864) and *Cradock Nowell* (1866), but his first distinct success was *Lorna Doone, a Romance of Exmoor* (1869), which reached a 22d edition in 1884, and has remained the favorite of his works. His other novels are: *The Maid of Sker* (1872) perhaps his second best story; *Alice Lorraine* (1875), *Cripples Carrier* (1876), *Erema* (1877), *Mary Anerley* (1880), *Christowell, a Dartmoor Tale* (1882), *Tommy Upmore* (1884), and *Springhaven* (1887).

**BLACK MOUNTAINS**, a group in Yancey county, N. C., a short distance west of the Blue Ridge, so called from the balsamic firs which grow on the crests of the mountains. Black Dome, or Mitchell's High Peak, is 6,707 feet, the highest peak east of the Rockies, and is named for Dr. Mitchell, of North Carolina, who died while exploring the region, and who is here buried.

**BLACK OAK**, a handsome large tree of the United States, constituting the genus *Quercus tinctoria*, or, according to some botanists, a variety of *Quercus coccinea*. It yields a thick bark much used for tanning and from which the yellow dye known as quercitron is obtained.

**BLACK PRINCE**, the popular title conferred upon Edward (1330-76), eldest son of Edward III. It is said, but not proven, that the name was given from the color of the armor worn by him. See *Britannica*, Vol. VII, p. 686; Vol. VIII, p. 319.

**BLACK QUARTER**, an infectious disease of cattle. See *MURRAIN*, *Britannica*, Vol. XVII, p. 58.

**BLACK RIVER**, or **BIG BLACK RIVER**, a stream 350 miles long which rises in Iron county, Mo., flows southwestward into the White River at Jacksonport in Arkansas, and is navigable, when the water is high, for about 100 miles, by small river steamboats.

**BLACK RIVER**, of New York, about 125 miles long, rises in Herkimer county, flows in a northwesterly direction and empties into Lake Ontario near Watertown. The Black River Canal, between Lyon's Falls and Rome, allows boats to pass from the river into Erie canal.

**BLACK RIVER FALLS**, a town of Wisconsin, county-seat of Jackson county, situated on Black River, about fifty miles north of La Crosse. The river furnishes a valuable water-power; and there are many flour mills, lumber mills, and other manufacturing.

**BLACK ROD**, GENTLEMAN USHER OF THE. In England, an officer of the House of Lords, appointed by letters-patent. He is chief gentleman-usher to the sovereign, and usher of the Garter, at the chapter-meetings, of which he keeps the door. He has charge of all arrangements for keeping order in

the House; takes into custody any peer guilty of breach of privilege; and (himself, or by his deputy the yeoman-usher) summons the House of Commons to the peers when the royal assent is given to bills, or when royal speeches are read. The appointment of messengers, door-keepers, etc., rests with Black Rod. His title is derived from the black rod which he carries. The name is also given to similar functionaries in the legislatures of the Dominion of Canada and other British colonies.

**BLACKSBURG**, a village of Virginia, about seventy-five miles west of Lynchburg. It is the seat of the Virginia Agricultural and Mechanical College.

**BLACK SNAKE**, a species of snake common in the United States from Louisiana to Connecticut; is of an almost uniform leaden color, is one of the largest serpents in North America, and is remarkable for its agility. It moves along the ground with a swiftness equal to that of a horse, glides over bushes, and climbs trees. It feeds on small quadrupeds, birds, frogs, etc.; frequently plunders poultry yards of eggs, and enters dairies to drink milk and cream, of which it is very fond, but compensates for these depredations by killing rats and mice. It has no poison fangs, but is not slow to bite.

**BLACKSTONE RIVER**, of Massachusetts, rises in Worcester county and empties into Providence River after having followed a southeasterly course. It measures about 75 miles, and furnishes water-power to several manufacturing villages.

**BLACKWALL**, a town of Middlesex, England, at the junction of the Lee with the Thames, four miles southeast of London; has foundries, ship building-yards, and the East and West India Docks. A railroad connects Blackwall with London, and, to avoid the dangers and delay of the "pool," many passengers proceed by this railway to embark in steamers at Blackwall instead of going on board at London Bridge.

**BLACK WALNUT**, the *Junglans nigra* of the United States. It is a handsome tree, which produces an edible nut, and is much prized for its valuable timber.

**BLACK WATCH**, the name given to the first of the Scottish Highland regiments which had its origin in a commission granted to John, second Earl of Athole, in 1668, to raise and keep a sufficient guard for securing peace in the Highlands. The term *black* arose from the dark color of their tartan uniform, which distinguished them from the regular troops, called the *Saighdean Dearg*, or "red soldiers." Originally three companies, in 1729 the number was increased to six, and these formed into the 42d Regiment under the command of the Earl of Crawford, in 1739. In 1743 the regiment joined the troops in Flanders and first went into action at Fontenoy, since which it has been one of the most distinguished corps in the British army. In 1872 the officers of the corps erected a monument in Dunkeld Cathedral in memory of those who had fallen in battle from the creation of the regiment till the close of the Indian mutiny in 1859; and a memorial cairn, raised by public subscription, was unveiled Nov. 13, 1887, in the field near Aberfeldy, where the regiment first assembled in 1739.

**BLACK WATER**, a name of five Irish rivers, one of which deserves notice—the Blackwater of Cork, which runs across Cork county in a carboniferous limestone basin. High mountains bound it on the south, and its chief feeders come from the north. It is 100 miles in length, the seventh in size of the Irish rivers. The scenery along its banks is extremely beautiful and picturesque, with ruins, mansions, and woods. It abounds in salmon.

**BLACKWELL, ALEXANDER**, adventurer, seems to have been born in Aberdeen about the beginning of the 18th century, and to have been a younger son of the Rev. Thomas Blackwell (1660-1728), principal of Marischal College. He may, or may not, have studied medicine under Boerhaave at Leyden; anyhow, about 1730 he was a printer in London, and becoming bankrupt in 1734, was supported in prison by his wife, who published a *Herbal* (2 vols. folio, 1737-39) with 500 cuts of plants drawn, engraved and colored by herself, her husband adding their Latin names, with a brief description of each. Next, in 1742, Blackwell turned up in Sweden, where, having cured the king of an illness, he was appointed one of the royal physicians, and undertook the management of a model farm. While still in the full enjoyment of court favor, he was charged with being concerned in a plot against the constitution, and after being put to the torture, was beheaded Aug. 9, 1747, protesting his innocence to the last.

**BLACKWELL, ELIZABETH**, born in Bristol, England, in 1821; came to the United States when a child, and was the first woman to attain the degree of M. D. in this country. She practiced medicine for many years, organized a woman's medical college in New York, and has written on the *Laws of Life* and the education of children. In 1869 she returned to England, where she took an active part in measures of sanitary reform.

**BLACKWELL, LUCY STONE**. See *STONE, LUCY*.

**BLACKWELL, THOMAS**, scholar, was born at Aberdeen in 1701, and took his M. A. in 1718. In 1723 he was appointed professor of Greek in Marischal College, and in 1748 its principal. He died at Edinburgh, March 8, 1756. He was author of *Inquiry into the Life and Writings of Homer* (1735); *Memoirs of the Court of Augustus* (3 vols. 1752-64), and two or three other works.

**BLACKWELL'S ISLAND**, a part of New York city; it lies in the East River, and has an area of 120 acres. On this island are charity and fever hospitals, a penitentiary, alms and workhouses, and a light-house.

**BLACKWOOD, WILLIAM** (1776-1834), a distinguished publisher, born at Edinburgh in 1776, at which place he settled as a bookseller in 1804. In 1817 he became a publisher on his own account and issued the first number of "Blackwood's Magazine." The literary ability displayed in this periodical was so much in advance of the monthly magazines then existing that from the first it was a great success, and it secured for itself a wonderful reputation. He was himself chief manager of the magazine, and conducted the whole of the correspondence connected with it until his death, in 1834. Under his sons, the Messrs. Blackwood, who succeeded him in the business, "Maga" has not only sustained but increased its reputation.

**BLACKWOOD RIVER**, in West Australia, enters the Hardy Inlet six miles northeast of Augusta. It flows through the counties of Durham and Nelson first to the west then to the south, traversing a district of wood and pasturage. It is navigable for boats to a distance of 20 miles.

**BLADDER GREEN**, and **SAP GREEN** are colors derived from the buckthorn, a genus of *Rhamnaceæ*, and in use by dyers and painters.

**BLADDER-NUT**, a genus of plants, *Staphylea*, the type of a small natural order, *Staphyleaceæ*. They are mostly trees or shrubs of elegant appearance, and the two species, *S. trifolia* and *S. pinnata*, are much used for ornamental planting. Inflated membranous capsules inclose the seeds and give the popular name to the trees. See *Britannica*, Vol. II, p. 320.



**BLADDER-SEED** (*Physospermum cornubiense*), an umbelliferous weed noted for its inflated fruit.

**BLADDER-SENNA** (*Colutea arborescens*), a leguminous tree of Southern Europe, frequently cultivated. It owes its name partly to the dry inflated pod, partly to its popular use as a purgative.

**BLADDER-WORM**, the asexual stage of a tape worm or cestode. The stage owes its name to the bladder-like form resulting from the encysted embryo. See TAPEWORMS, *Britannica*, Vol. XXIII, pp. 52, 53.

**BLADDERWORT**, a genus of plants of the natural order *Lentibulaceæ*, containing numerous species. Their bright blossoms, with those of the water lilies, etc., adorn the surface of lakes, ditches, and marshes in almost all parts of the world; they are particularly abundant within the tropics. The roots, stems, and even leaves are furnished with numerous little bladders, which are filled with water, till it is necessary that the plant should rise for the expansion of the flowers, when they become filled with air; and this again gives place to water after flowering is over, so that the seeds are ripened at the bottom. The bladders of some species have an orifice closed by a very thin elastic valve opening inwards; aquatic insects sometimes enter them and are imprisoned.

**BLADENSBURG**, a village of Prince George's county, Maryland, situated on the eastern branch of the Potomac, about six miles northeast of Washington. It was the scene of a battle fought Aug. 24, 1814, which resulted in the defeat of the Americans, and the capture and destruction of the city of Washington by the British.

**BLADEN SPRINGS**, a village of Choctaw county, Alabama, situated near the Tombigbee River, about eighty-five miles north of Mobile. It is noted for its copious medicinal springs. These are six in number, saline-chalybeate, and are highly valued for their curative effects in cases of dyspepsia, chronic rheumatism, and kidney and bowel complaints.

**BLAES**, a Scottish collier's name for the shale of the coal-measure, originating apparently from the "blae" or bluish color sometimes noticed in the shale. The term is occasionally used by geologists.

**BLAEU, WILLIAM JANSZON**, Dutch mathematician, map-drawer and publisher, born at Alkmaar, Holland, in 1571, died in 1638. His terrestrial and celestial globes excelled in beauty and accuracy everything that had preceded them. For description of his work, see *GLOBE*, *Britannica*, Vol. X, p. 683. His son, Jan, commenced business on his own account at Amsterdam in 1637, but afterwards entered into company with his brother Cornelius (died 1650). He edited the well-known *Atlas-Major* in eleven volumes. This is a remarkable work, with many curious plates; and the maps are extremely valuable from the light they throw on local history. He further published a series of topographical plates and views of towns. Jan left three sons, two of whom carried on the business with success until about 1700. Some of their classical publications, especially Cicero's *Orationes* (1699), are highly prized.

**BLAGOVIESHTSCHENSK**, a town of the Amur province of Russian Asia, at the confluence of the Amur and Seja rivers. Till 1882 it was the capital of the province. Population, 7,975.

**BLAINE, JAMES GILLESPIE**, an American statesman, born of Scotch-Irish parentage at West Brownsville, Pa., Jan. 31, 1830. As a boy at school he excelled in literature and mathematics, and at the early age of thirteen entered Washington College in his native county, graduating in 1847. Sub-

sequently he became a teacher in the military institute at Blue Lick Springs, Ky., where he married Miss Harriet Stanhope, a teacher in a neighboring seminary. Soon after his marriage he removed to Pennsylvania, and after studying law for a short time became a teacher in the Institution for the Blind at Philadelphia. In 1854 he removed to Augusta, Me., entering the journalistic ranks, first as editor of the "Kennebec Journal," and later as editor of the "Portland Advertiser." In 1858 he was elected to the State legislature, and served two terms, officiating as speaker during the last two years. During the same year (1858), he was made chairman of the Republican State Committee, which office he held for a score of years. In 1862 the Republicans elected him to the House of Representatives, and for 20 years he served in one or the other of the two Houses of Congress. During the war he favored all judicious and practical resolutions for its vigorous prosecution, and at its close he bore an active part in the reconstruction measures of the country. The 14th Constitutional Amendment was called the "Blaine Amendment," as it was formulated and earnestly advocated by him. He was largely instrumental in the negotiation of a treaty with England, in which the doctrine of perpetual allegiance was abandoned, and Great Britain accepted the American principle of equal rights and protection for adopted as well as for native citizens. From 1869 to 1875 Mr. Blaine was speaker of the House of Representatives, and his record in this capacity is generally conceded to have been a brilliant one. As presiding officer he was distinguished for his knowledge of parliamentary law, his impartiality in administration, and his physical endurance. His course in connection with the general amnesty bill, which provoked stormy discussion in 1876, strengthened his influence in the Republican party.

In 1876 Mr. Blaine was elected to the United States Senate, and at once became a most prominent and efficient member of that body. In the Republican national convention of that year he was a prominent candidate for nomination to the presidency of the United States, and lacked only 28 votes out of a total of 754 of receiving the nomination. At the Republican national convention in 1880 his friends again presented his name for nomination, and on the first ballot the vote stood: Grant 304, Blaine 234, Sherman 93, Edmunds 34, Washburn 30, Windom 10, Garfield 1. On the election of Mr. Garfield, Mr. Blaine accepted the appointment of Secretary of State, filling the office with rare ability and success, until the death of the president, when he retired from active public work, and began to write his famous historical work, entitled *Twenty Years of Congress*. In 1884 Mr. Blaine received the Republican nomination for President, but after a vigorous contest, failing to secure the electoral vote of the State of New York by the narrow margin of 1,047 votes out of a total of over 1,200,000, he was defeated in the general election. He spent the ensuing four years at work on his book and in foreign travel.

At the time of the nominating convention in 1888, Mr. Blaine was in Europe, and by formal letter declined to permit his friends to present his name as a candidate for the presidency. He returned, however, in time to aid efficiently in the canvass for Mr. Harrison, and on the election of the latter again accepted the appointment as Secretary of State. Among the important services since rendered in this office he took a leading part in settling the Samoan difficulties in the treaty between Germany, England, and the United States, and successfully invited and most efficiently presided over the Pan-American Congress held in Washington. In June,

1892. Mr. Blaine resigned his office to become a candidate for the Republican Presidential nomination, but failed to receive it.

BLAIR, FRANCIS PRESTON, born in Abingdon, Va., April 12, 1791, died at Silver Spring, Md., Oct. 18, 1876. He early entered political life, and in 1829 was requested by the President to establish a Democratic newspaper in Washington which should be the organ of the party. In response Mr. Blair started the "Globe," and conducted it till 1845. In 1854 he assisted in organizing the Republican party; in 1860 was a member of the Chicago convention which nominated Mr. Lincoln, and after his election had considerable influence in the administration. He went South in 1864, and through personal influence tried to effect a peace with Jefferson Davis and other Southern leaders. The "peace conference," of Feb. 3, 1865, was a result of his labors. After Lincoln's death he opposed reconstruction measures and gave his support to the Democratic party.

BLAIR, FRANCIS PRESTON, son of Francis P. Blair, born at Lexington, Ky., Feb. 19, 1821, died at St. Louis, Mo., July 8, 1875. He was a Princeton graduate and began the practice of law in St. Louis in 1843. He served in the Mexican war, was editor of the "Missouri Democrat" and from 1852 to 1856 was in the Missouri Legislature. He joined the new Republican party in 1856 and was sent to Congress. In 1862 he was reelected. In 1861 he commanded an unauthorized force which guarded the St. Louis arsenal and took the State forces under General Frost, thus saving Missouri and Kentucky from the Confederates. He fought in the civil war, and was raised to the rank of major-general. He was at Lookout Mountain, Missionary Ridge and marched with Sherman to the sea. After the war he left the Republican party, being dissatisfied with its policy, was elected to his State legislature and in the same month was elected by the Democrats to the United States Senate.

BLAIR, HENRY WILLIAM, born at Campton, N. H., Dec. 6, 1834. His parents died before he reached the age of 13, and his early educational advantages were very limited on this account, and also because of his own ill-health. He studied law and in 1860 was elected prosecuting attorney of Grafton county. He enlisted in the civil war, but at the siege of Port Hudson was so severely wounded that he was unable to engage in any further military service. He was from 1866 to 1869 in the New Hampshire legislature, and since 1875 has served in Congress. He is a reformer and introduced the important "Blair Common-School Bill." He gives his support to all such social questions as temperance and woman suffrage.

BLAIR, JAMES, educator, born in Scotland in 1656, died in Williamsburg, Va., Aug. 1, 1743. He was a clergyman of the Episcopal church and spent most of his life in the colony of Virginia. He established the William and Mary College, having gathered funds for it and secured the charter from the king. He was appointed its first president.

BLAIR, JOHN INSLEY, capitalist, born in Warren county, N. J., Aug. 22, 1802. He has been an active business man, assisting in developing coal mines in Pennsylvania, building the railroad between Owego and Ithaca, N. Y., building the Delaware, Lackawanna and Western Railroad, and also assisting in laying roads in Iowa, Wisconsin, Kansas, Nebraska, Missouri and Texas. He was one of the original directors of the Union Pacific Railroad. He is a Republican, a member of the Presbyterian church, and a liberal benefactor of educational and religious objects, having given over \$500,000 for benevolent purposes.

BLAIR, MONTGOMERY, born in Franklin county Ky., May 10, 1813, died at Silver Spring, Md., July 27, 1883. He served in the Seminole war, held several judicial positions in Missouri and Maryland, and being appointed by Lincoln to the Cabinet as Postmaster-General, he instituted various improvements in his department—notably money orders and postal railroad cars. He is said to have been the only one of the Cabinet who opposed the surrender of Ft. Sumter. After 1867 he lent his influence to the Democratic party.

BLAIR—ATHOL, a village in the county of Perth, Scotland, situated at the confluence of the Tilt and Garry. Blair Castle, the seat of the duke of Athol, is situated here. The larch-trees surrounding it are remarkable alike for their enormous size and for the fact of their being among the first planted in Scotland. See Britannica, Vol. XIV, p. 311.

BLAIR, a city of Nebraska, county-seat of Washington county, and an important railroad center. It is situated about three miles west of the Missouri River and thirty miles above Omaha. It has a large local trade and various important industries. It contains a number of elevators, mills, and wagon-factories.

BLAIR—GOWRIE, a village of Perthshire, very beautifully situated on the east side of a range of hills, on the right bank of the Erich, 16 miles north-east of Perth. It consists chiefly of one winding street. It has flax-spinning and weaving factories, driven by the Erich, employing 700 to 800 hands. Pure white marble is found in the vicinity. Population, 4,833.

BLAIR, ROBERT, author of *The Grave*, was born in 1699 at Edinburgh, where his father was a clergyman. There and in Holland he was educated for the church, and in 1731 he was ordained minister of Athelstaneford, Haddingtonshire, where he lived in easy circumstances till his death, Feb. 4, 1746.

BLAIRSVILLE, a village of Georgia, county-seat of Union county. It is noted for the marble and gold found in its vicinity.

BLAIRSVILLE, an important shipping center of Pennsylvania, situated on the Conemaugh River, about 55 miles east of Pittsburgh. Coal, lumber, grain and pork are shipped in large quantities.

BLAKE, EDWARD, son of William Hume Blake, born in Adelaide, Middlesex county, Ontario, Can., Oct. 13, 1833. He graduated with honors from the University College of Toronto in 1857, and two years later was called to the bar. He was simultaneously a candidate for election to the House of Commons of the Dominion and the Legislative Assembly of Ontario. To the latter body he was elected, and soon became (1867) leader of the opposition. In 1871 he became premier of the Ontario legislature, holding office for one session and then resigning. Under the Mackenzie administration Mr. Blake held successively two important cabinet positions.

BLAKE, LILLIE DEVEREUX, author and woman's suffrage advocate, was born in Raleigh, N. C., Aug. 12, 1835. She was married in 1855 to F. G. Q. Umsted, who died in 1859, and in 1865 to Grenfell Blake. She is president of the New York Woman's Suffrage Association.

BLAKE, SIR HENRY ARTHUR, entered the Irish constabulary in 1859; became resident magistrate in 1876; special resident magistrate of the Eastern Division in 1882, and has since been governor of the Bahamas, of Newfoundland and of Jamaica.

BLAKE, WILLIAM PHIPPS, an American mineralogist, was born in New York in 1826. He has written largely on scientific subjects, and has been connected with many exploring and other expeditions.



BLANC, ANTHONY, born in Surry, France, Oct. 11, 1792, died at New Orleans, June 20, 1860. He was a Roman Catholic archbishop. He left his native country in 1817, a year after his ordination to the priesthood, and came to the United States; was created bishop of New Orleans in 1835, and archbishop in 1850. He founded a theological seminary, introduced several religious orders into his diocese, visited Rome, founded colleges, academies for young ladies, free schools, convents and orphan asylums.

BLANC, AUGUSTE, a French art critic, brother of Jean Joseph Louis, born at Castres in 1813, died in 1882. His contributions to various French periodicals, on matters connected with art, were numerous. He was the editor and principal writer of the very complete and extensive *History of the Painters of all the Schools*. His *Works of Rembrandt* has passed through many editions. He was director of Fine Arts in 1848 and in 1871.

BLANC, JEAN JOSEPH LOUIS (1811-82), French Socialist and historian, born Oct. 29, 1811, at Madrid, where his father was inspector-general of finance under King Joseph. After finishing his school education he went to study in Paris. For two years he was a private tutor at Arras, and in 1834 returned to Paris, where he contributed to various political papers, and where in 1839 he founded the *Revue du Progrès*, in which he first brought out his chief work on Socialism, the *Organisation du Travail*, which in 1840 appeared in a separate form. The book asserts that in the existing order of society the spread of education among the masses would be dangerous—would, in fact, be impossible. It denounces the principle of competitive industry, and proposes the establishment of social workshops, composed of workmen of good character, and subsidized by the state. The book obtained for its author a wide, enthusiastic popularity among French workmen. Next, in 1841-44, Blanc published an historical work, entitled *Histoire de Dix Ans* (1830-40), which produced a deadly effect on the Orleans dynasty. It owed its success partly to the exposure it made of the immorality of the crown and its advisers, partly to that passionate ardor which changed the tranquillity of history into the vehemence of a pamphlet. This was followed by the first volume of a *Histoire de la Révolution Française*. On the breaking out of the revolution of February, 1848, his popularity with the working classes led to his appointment as a member of the Provisional Government, and he was placed at the head of the great commission for discussing the problem of labor, which had its sittings in the palace of the Luxembourg. He was accused of a share in the disturbances of the summer of 1848, and made his escape to London, where he spent many years. During his exile he devoted himself to political and historical literature. He completed his *Histoire de la Révolution Française*, and carried on a large correspondence for the French journals. On the fall of the Empire Blanc returned to France, and was elected to the National Assembly in 1871. After 1876 he was member of the chamber of deputies. He died at Cannes, Dec. 6, 1882.

BLANC, LE, a thriving town of France, in the department of the Indre, situated on the Creuse. Above Le Blanc the river expands so as to form a lake, but at the town it contracts, and breaks into cascades with sufficient fall to turn the machinery of several manufactories. It has linen-yarn and cloth-mills, potteries, tanneries, vinegar-works, forges, etc. It is very ancient, having been frequented by the Romans. Population, 6,000.

BLANCH, or BLENCH-HOLDING, one of the ancient feudal tenures in the law of Scotland relat-

ing to land, the duty payable to the superior or lord being in general a trifling sum, as a penny Scots, or merely illusory, as a pepper-corn, 'if asked only.' Anciently many estates in Scotland were held, both by the crown and other superiors by this tenure. It is now seldom adopted in the constitution of an original right of property.

BLANCHARD, THOMAS, born at Sutton, Mass., June 24, 1788, died at Boston, April 16, 1864. He was an inventor, and some of his inventions were a new method of making tacks by machinery, a machine for turning and finishing gun-barrels, and an improved form of steamboat to be used for ascending rivers which have a rapid current. He also invented a steam wagon (before any railroad had been built), a method for bending heavy timber, and a machine for cutting and folding envelopes.

BLANCHING, a process resorted to by gardeners to avoid certain secretions which in ordinary circumstances take place in the leaves of plants, and to render them more wholesome for food. Blanching is accomplished in various ways, as by drawing up earth to the plants when the lower part of the leaf or leaf-stalks alone is to be blanched; tying the leaves together, by which the inner ones are blanched, as is commonly done in lettuce, etc. Blanching, although so simple and easy, is of great importance in the art of gardening, and the usefulness of many plants very much depends upon it. In cabbage and some other plants, the leaves form themselves into compact heads, and there is a natural blanching or etiolation.

BLANC-MANGE (Old French, *blanc manger*, "white food"), a dish formerly made of fowl, meat, eggs, etc.; now a name of different preparations composed of dissolved isinglass, arrow-root, cornstarch, etc., with milk and flavoring extracts.

BLANCO, CAPE, a remarkable headland on the west coast of Africa, the extremity of a rocky ridge, (called Jebel-el-Bied), which projects from the Sahara in a westerly direction, and then bending southward forms a commodious harbor, called the Great Bay. Southward to the mouth of the Rio Grande the shores are of a sandy character, with a current tending southwest, and prevalent northeast trade-winds. On account of the deficiency of good harbors, the prevalence of west winds, and other causes, the casualties to shipping are very numerous. The natives of the Canary Islands carry on a pretty lucrative fishery in the bay in boats of from 100 to 150 tons burden. Cape Blanco, which is composed of mixed calcareous and siliceous sandstone, was first discovered by the Portuguese in 1441.

BLAND, a beverage which is a common drink among the inhabitants of the Shetland Islands during the summer months. It has been described as being perfectly good and transparent when a year old, its flavor then bearing a strong resemblance to that of lemon juice.

BLANDFORD-FORUM, a town in Dorsetshire, England, on the right bank of the Stour, sixteen miles northeast of Dorchester. It lies on a fine tract of pasture-land, famed for its multitude of cows. It is built of brick, and is neat and regular. It has manufactories of shirt buttons, and was formerly famed for its manufactures of band-strings, and point-lace. Population, 4,110.

BLANDRATA, GIOVIO, founder of Unitarianism in Poland and Transylvania, born in Saluzzo, Italy. He established himself as a physician at Pavia, but, on account of his heretical opinions, he was compelled to fly to Geneva in 1556. He went to Poland in 1558, hoping to find a greater freedom for thought and speech. In 1563 he

became the favorite physician of John Sigismund, prince of Transylvania. Here he spread his doctrine, and formed a considerable party. He was murdered in 1590 by his nephew, whom he had threatened to disinherit for his attachment to the Roman Catholic Church.

BLANKENBERGHE, a village on the coast of West Flanders, nine miles north of Bruges by rail. It has a harbor and a light-house, and the place is a popular summer resort. Population, 3,328.

BLANKENBURG, a town in the duchy of Brunswick, situated on the Harz mountains. It is walled, has a gymnasium and several charitable and educational institutions. Mining is the chief industry, iron, marble and dye-earths being abundant in the surrounding districts. Population, 3,600. On the lofty summit of Regenstein, half a mile distant, are the remains of a large castle, hewn out of the rock by Henry the Fowler in 919. Louis XVIII resided at Blakenburg, as Comte de Lille, from 1796 to 1798.

BLANKETEERS, the name applied to a body of Manchester operatives, who on March 10, 1817, met in St. Peter's Field, intending to march thence to London with a petition for parliamentary reform. Each man of the company had a rug or blanket strapped on his shoulders, so that he might bivouac on the road if necessary.

BLANK VERSE, a verse without rhyme and depending on meter alone. The classical productions of the Greek and Roman poets are composed on this principle. When the passion for imitating classical models set in, rhyme came to be looked upon as an invention of Gothic barbarism, and attempts were made in most countries to shake it off. The Italian and Spanish writers used blank verse as early as the beginning of the sixteenth century. The first blank verse in English is a translation of the second and fourth books of Virgil's *Æneid*, by the Earl of Surrey, who was executed in 1547. Its adaptation to the drama was at once felt, and it soon became and has continued dominant in that department; but in other kinds of poetry it was not till the appearance of *Paradise Lost* (1667) that it could be said to have taken root, and even then the want of rhymes was felt, as the poet expected it would be. Many poets have since followed Milton's example. Some would restrict the name to lines of ten syllables, not considering it applicable to such metres as Southey's *Thalalaba* and Longfellow's *Hiawatha*. In Italian and Spanish it never became popular, still less in French. The German language seems to admit every variety of blank metre.

BLANQUI, JEROME ADOLPHE, one of the first French economists, born at Nice in 1798, died at Paris in 1854. He was educated at the Lyceum of Nice, which city his family quitted in 1814, and he went to Paris to complete his studies. In 1825 he was appointed Professor of History and of Industrial Economy in the Commercial School at Paris. In 1838 he became a member of the Academy of Moral and Political Science. The Academy sent him to Corsica to study the condition of that country, and afterwards to Algiers and Turkey. He was requested to furnish a complete account of London in its financial and other aspects. This task he executed to the satisfaction of the *savans* who employed him. The Academy highly valued his abilities. In method he was ingenious, in style transparent, and even dry. Discussions became interesting from his lively mode of treating them. As a national economist he was somewhat inclined to Socialism; he was also in favor of free-trade. He wrote some excellent works on Political Economy.

BLANQUI, LOUIS AUGUSTE, brother of the preceding, born at Nice in 1805, died in 1880. He made himself conspicuous chiefly by his rabid advocacy of most extreme political opinions, which eventually led to his being condemned to ten years' imprisonment in Belleisle.

BLAPS, a genus of insects of the order *Coleoptera*, the type of a tribe called *Blapsides*. The species are numerous, of a dark color, destitute of wings, and have the elytra or wing case united. They inhabit dark and damp places, and feed chiefly on dead vegetable matter. They have the power of secreting and emitting a brownish acid, irritating fluid of a peculiar and penetrating odor, with which they appear to be furnished for the purpose of self-defense.

BLÄSER, GUSTAV, a German sculptor, born at Dusseldorf in 1813. He is best known in this country by his bust of Humboldt in Central Park, New York. Other principal works are his colossal statue of Prussia, in Berlin, and his equestrian statues of Frederick William III and Frederick William IV.

BLASPHEMY. See Britannica, Vol. III, p. 807. In the United States, blasphemy has been made the subject of statutory enactments by several of the individual States. These enactments, however, are little more than confirmations of the common law and the older statutory laws of England. Profanity is generally classed by these State laws with blasphemy as an indictable offense.

BLASTING. See Britannica, Vol. III, pp. 808-11. See also EXPLOSIVES, in these Revisions and Additions.

BLASTODERM, an embryological term applied to the layer or layers of cells arising from the germinal disc, or the portion of a partially segmenting egg which undergoes division. In ova where there is a large quantity of nutritive material or yolk, as in fish or bird, the whole ovum cannot divide, and only a small (germinal) disc of "formative protoplasm" does so. The cells resulting from the division of this area become afterwards disposed in the ordinary germinal layers, and are in their earlier stages, as they grow round the yolk and become in their area of origin the seat of embryonic development, called the blastoderm.

BLAVATSKY, HELENE PETROVNA, theosophist, born in Russia about 1831. Col. Peter Hahn is her father, and Gen. Nicéphore V. Blavatsky, deceased, a former governor of Armenia, was her husband. She has studied the mysteries of Buddhism in a Himalayan retreat, has published *Isis Unveiled*, and has founded the Theosophical Society, of which Col. F. P. Olcott is president, and Madame Blavatsky the secretary. She died in 1891.

BLAYE, a fortified seaport of France, in the department of the Gironde, twenty miles from Bordeaux. It is defended by two forts. The port of Blaye is a very busy one, all inward bound vessels being required to anchor and deliver the manifests of their cargoes, and many outward bound lay in their provisions here. It has manufactories of linen and woolen, glass and earthenware, a considerable export trade in corn, wine, brandy, oil, fruits, soap, etc., and tribunals of jurisdiction and of commerce. It has a strong modern citadel, theater, hospital, agricultural society, etc. Population, 4,765.

BLAZON, BLAZONRY, heraldic terms originated in the custom of blowing a trumpet to announce the arrival of a knight, or his entrance into the lists at a tournament. The blast was answered by the heralds, who described aloud and explained the arms borne by the knight. It thus came to signify the art of describing the objects, their



positions, gestures, tinctures, etc., and the manner of arranging them on the shield.

**BLEACHING.** See *Britannica*, Vol. III, pp. 811-23.

**BLEAK**, a small fresh-water fish of the family of *Cyprinidae*, of the same genus with the Dace, Minnow, etc. It is six or seven inches long, the nose is pointed, and the under jaw is longer than the upper; the scales are beautifully striated, the back an oliveaceous green, and the sides, cheeks, and gill-covers silvery white. The tail is forked for half its length. On the inner surface of the scales a silvery substance is found in such abundance as to be much used for making artificial pearls, the white beads so common in many ornaments. It is not only a pretty fish, but is also much prized for the table.

**BLED SOE**, ALBERT TAYLOR, born in Frankfort, Ky., Nov. 9, 1809, died in Alexandria, Va., Dec. 8, 1877. He graduated at West Point, served on military duty in the Indian Territory, followed the teaching profession at Kenyon and subsequently at Miami, studied theology and preached for various churches (1835-38), studied and practiced law (1838-48), taught mathematics in the University of Virginia (1854-61), entered the Confederate army, and was made chief of the war bureau. In 1866 he began the publication of the "Southern Review," the organ of the Methodist Episcopal Church in the South. He wrote for various publications and published several books.

**BLEIBACH**, a town of Austria, in the province of Carinthia, pleasantly situated in the valley of the Drave, near the celebrated Bleiberg (Lead Mountain). The inhabitants are chiefly engaged in mining, and in washing and smelting the ore, of which from 1,500 to 1,800 tons are annually obtained. Population, 5,600.

**BLÉNDE**, a name applied to a number of minerals composed chiefly of sulphur and certain metals, almost all of splendid lustre, but more exclusively to garnet or zinc blende. It is abundant in primitive and secondary rocks in many parts of the world, and is often associated with galena or lead-glance. It contains about sixty-six parts of zinc and thirty-three of sulphur. See *Britannica*, Vol. XVI, p. 392; Vol. XXIV, p. 785.

**BLÉNEAU**, a village in the French department of Yonne, situated twenty-nine miles southwest of Auxerre. Here Turenne gained a victory over the Prince de Condé in 1652.

**BLÉNHEIM**, capital of Marlborough district, New Zealand situated on the Wairau River, near the coast, twenty miles south of Pictou by rail. Population, 3,094.

**BLÉNHEIM DOG**, or Marlborough Dog, a small spaniel, much resembling the King Charles breed in form and general appearance, but differing in the color, which is white, with orange or flamed-colored markings. In weight it should not

exceed five pounds. The Blenheim spaniel is the *Pyrame* of Buffon. It derives its English name from Blenheim Park, in Oxfordshire, where the breed was a favorite one from the beginning of the eighteenth century.

**BLÉNNEY**, a genus of acanthopterygious fishes, the type of a family, *Blenniidae*, of which the sea-wolf is the largest example. See *Britannica*, Vol. XXI, p. 614. The blenny is remarkable for the abundance of slimy matter which covers the skin. Many are destitute of scales. They have only one dorsal fin. Living in shoals which do not consist of great numbers, and frequenting rocky coasts, they are often found in pools left dry by the tide, or even among sea-weeds. They possess the power of using their ventral fins to aid them in moving about. Many of them retain their eggs within the oviduct until they are hatched, so that the young may be capable of seeking food for themselves. See *Britannica*, Vol. XII, p. 690.

**BLÉNNORRHŒA**, in pathology, a term applicable to a copious discharge from any mucous surface, but usually restricted to discharges from the genito-urinary mucous membrane.

**BLÈRE**, a town of France, in the department of Indre-et-Loire, situated on the left bank of the Cher, which is crossed by a bridge, said to owe its origin to Henry II, of England. In its vicinity is the castle of Chenonceaux, the residence purchased by Henry II, of France, for the celebrated Diana of Poitiers. The castle escaped the fury of the Revolution, and is still in a good state of preservation. Among the curiosities shown to the visitor is the mirror used by Mary Stuart (Queen of Scots) on her marriage with the Dauphin. Population, 3,561.

**BLETCHINGLEY**, a town of Surrey, 20 miles south of London. From 2,000 to 3,000 tons of Fuller's earth are raised annually near Bletchingley. In cutting the railway tunnel the fossil bones of the iguanodon, an extinct reptile, were found here; also many Roman coins have been found in the vicinity. Population about 2,000, chiefly agriculturists.

**BLETS**, decayed spots in apples, pears and other fruits. This decaying is often called *bletting*. It takes place chiefly by the decomposition of the protein compounds which the fruits contain, and the fermentation of the sugar; carbonic acid is formed, and by the microscope there may be discovered the fibers of a fungus pervading the bletted part.

**BLIGH ISLANDS**, that portion of the Feejee archipelago originally discovered by Tasman in 1643, and seen by Captain Bligh, of the *Bounty*, during his wonderful voyage in an open boat. The group lies in nearly 180° of longitude, and 15° 30' south latitude.

**BLIGHT.** See *FUNGUS*, *Britannica*, Vol. IX, pp. 827-36. See also *MILDEW*, Vol. XVI, pp. 293-94.

**BLIND, BOOKS FOR THE.** For general article on the **BLIND**, see *Britannica*, Vol. III, pp. 826-33. The first printed book for the blind was brought out in 1784 by M. Valentine Haüy, of Paris, the founder of the *Institut des Jeunes Aveugles*, the institution for blind children. The book was printed in raised type, the italic letter or written form of Roman letter being used. Haüy cast fonts of types, which were approved by the French Academy of Sciences, and exhibited them to the royal family at Versailles, the new art producing a great sensation.

Mr. James Gall, of Edinburgh, saw specimens of Parisian type in 1826, and resolved to print a Bible for the blind. Being a printer and publisher, he

endeavored to improve the type. His first "book" was brought out in 1827 in a triangular modification of the common alphabet, of which the following is a specimen:

BEKOLΔ THE LAMB OF GOD

Later, Gall brought out other volumes in serrated letters, of which the following is a specimen:

Bekold the Lamb of God

The following is a specimen of the type used in 1834 by Dr. Samuel G. Howe, of Boston, and this was the style of letter used later by the American





lower rows, as in "d," add the suffix in the upper row. The following is the complete alphabet of capitals, as given by Mr. Wait in his "New York" system:

|    |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|
| A  | B   | C   | D   | E   | F   |
| •• | ••• | ••• | ••• | ••• | ••• |
| G  | H   | I   | J   | K   | L   |
| •• | ••• | ••• | ••• | ••• | ••• |
| M  | N   | O   | P   | Q   | R   |
| •• | ••• | ••• | ••• | ••• | ••• |
| S  | T   | U   | V   | W   | X   |
| •• | ••• | ••• | ••• | ••• | ••• |
|    | Y   | Z   |     |     |     |
|    | ••• | ••• |     |     |     |

Mr. Wait's system furnishes a list of *word* and *part-word* signs, and also signs for *numerals* and *punctuation* marks, as follows:

## WORD AND PART-WORD SIGNS.

|     |     |    |      |     |    |    |
|-----|-----|----|------|-----|----|----|
| the | and | of | that | ing | oh | ou |
| ••  | ••  | •• | ••   | ••  | •• | •• |
|     |     | sh | th   | wh  |    |    |
|     |     | •• | ••   | ••  |    |    |

## NUMERALS.

|    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 0  |
| •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |

Prefix, indicating that the characters which follow are numerals, ••• The Decimal point is •

## PUNCTUATION MARKS.

Period, ••, or a blank space equal to five points in length.

Comma, •, preceded and followed by a blank space equal to two points.

Semi-colon, ••, preceded and followed by a blank space equal to two points.

Colon ..... • Exclamation ..... ••

Apostrophe ..... •• Asterisk ..... ••

Hyphen ..... •• Quotation ..... ••

Interrogation ..... • Dash ..... ••

Parenthesis ..... •

Writing for the blind is done by means of a style which, being pressed vertically on prepared paper laid over "dot grooves" in a tablet, thus forming on the under surface of the paper the desired raised signs. In order to secure neatness, exactness, and despatch in writing a piece of apparatus was invented by Mr. Wait called a "guide," and partially shown in the accompanying cut. It consists of two metallic tablets fastened together with hinges at one end. The upper one, fully illustrated in the cut, is substantially a frame with three rows of rectangular openings, each sufficiently wide to include two rows of dot signs, or one full line of sign letters. The under tablet, not shown in the cut, contains six parallel rows of *dot grooves* so arranged that all the grooves, when the upper frame is shut down, will be directly under the corners of the rectangular open spaces. The paper being placed between the tablets and the latter closed, the writer, with the style in hand, presses the prepared paper into the grooves so as to make the raised letters beneath.

n o i t u t i t s n i



The writing is executed from *right to left*; so that the "raised" letters, which at first are on the under side, may read correctly from *left to right*. Thus in the cut the word "Institution" appears as written backward; but when completed, and the paper turned for the reader, it appears thus:

I n s t i t u t i o n

This New York system of writing and reading for the blind is rapidly winning its way in many sections of the United States, and has also been successfully introduced into several other countries. Its principal publishing house is in Louisville, Ky., from which numerous publications for the blind have issued—books for schools (primary and graded, including those for academic classes); books for home miscellaneous reading, and books for students in music. The writer of these paragraphs has now on his table a volume entitled *A Practicable System of Tangible Musical Notation and Point Writing and*

*Reading for the Use of the Blind*, by William B. Wait, and also a copy of the current series of *International Sunday-School Lessons for the Blind*, sent out monthly by the publishing house in Louisville, for the supply of the blind pupils in Sunday Schools.

Experienced teachers report that nearly all pupils, older or younger, learn to read the point system with remarkable facility. A single illustration is here given: A gentleman in middle life, blind from early childhood, while making a recent call at the New York Institution for the Blind, expressed with a sigh his regret that he had not been able to learn to read with any satisfactory facility. On learning that he had not tried the point system, the superintendent asked leave to give him a brief lesson. This was done, and in fifteen minutes the blind gentleman (40 years of age) had not only learned the alphabet but how to use it, and with joyous gratitude received a book for his own instructive reading on the journey which he was making to a distant town.

**BLIND, KARL**, an eminent German politician, born at Mannheim in 1820. He was prominent as an agitator in connection with the revolutionary movements of 1848 and 1849, and in 1852 he fled to England. He was pardoned by the government, and in 1867 he returned to Germany. He is known in this country as a contributor to magazines and reviews, and as a zealous opposer, for many years, of the policy of Bismarck.

**BLINDAGE**, in military language, a screen made of trees or earth and timber used to protect from the enemy's fire men at work in a trench.

**BLIND-STORY**, in mediæval church architecture the triforium, a term properly restricted to examples having no exterior windows, as opposed to the clerestory of a church, which supplied the light for the interior.

**BLIND-WORM**, or **SLOW-WORM** (*Anguis fragilis*), a limbless lizard in the skink family. See **LIZARD**, Britannica, Vol. XIV, p. 735.

**BLISS, PHILIP PAUL**, singing evangelist, born in Clearfield county, Pa., July 9, 1838; killed in the railroad disaster at Ashtabula, Ohio, Dec. 29, 1876. He had but little education, but his fondness for music led him to gain what knowledge he could of this art by attending conventions and the Academy of Music at Geneseo, N. Y. After the war, to which he was drafted in 1864, he held musical conventions and composed numerous songs. He became acquainted with D. L. Moody and was persuaded to devote his life to evangelical work. His labors were in constant demand throughout the United States and Canada. He was a man of considerable personal magnetism, was a ready speaker and possessed a sweet sympathetic voice in singing. His singing was not scientific, but exerted a powerful influence on a miscellaneous audience. He published several collections of songs. Among his most famous songs are *Hold the Fort, Pull for the Shore*, and *Down Life's Dark Vale We Wander*.

**BLIZZARD**, a fierce storm of bitter frosty wind, with fine blinding snow, in which, especially in the Western States of the American Union, man and beast often perish. In one which visited Dakota and the States of Montana, Minnesota, Nebraska, Kansas and Texas in January, 1888, the mercury fell within twenty-four hours from 74° above zero to 28° below it in some places, and in Dakota went down to 40° below zero. In fine clear weather, with little or no warning, the sky darkened and the air was filled with snow, or ice-dust, as fine as flour, driven before a wind so furious and roaring that men's voices were inaudible at a distance of six feet. Men in the fields and children on their way from school died ere they could reach shelter; some of them having been not frozen, but suffocated from the impossibility of breathing the blizzard. Some 235 persons lost their lives. This was the worst storm since 1864; the Colorado River in Texas was frozen with ice a foot thick, for the first time in the memory of man. Really disastrous blizzards are rare, those of 1836, of December, 1863, January, 1866, January, 1873, being, till that of 1888, the severest on record. The word is a popular formation, originating in the United States, and seemingly akin to *blast*, *bluster*. The term was in colloquial use in the West early in the century, but first became usual throughout the United States during the severe winter of 1880-81.

**BLOCK, MAURICE**, statistician, born at Berlin, of Jewish family, Feb. 18, 1816, and studied at Bonn and Giessen. He settled at Paris, where for a time (1852-62) he held a post in the statistical bureau. He has published many works on the statistics of France and Europe, including the *Annuaire de l'Économie Politique et de Statistique*.

**BLOCK-HOUSE**, an edifice constructed of hewn timber sufficiently thick to be bullet-proof, and provided with loopholes for musketry. A block-house may be of one or more stories and of any size and shape. When of more than one story, the upper is made to project over the lower to enable the occupants to fire through loop-holes in the floor. In localities where timber is plentiful, and an artillery attack not to be feared, it forms a useful defensive work, and under these conditions it is often used in a rough country. When a block-house stands alone it constitutes an independent fort, and forms a barracks for its garrison.

**BLOCK ISLAND**, formerly called Manisees, situated in the Atlantic about nine miles south of Rhode Island, to which it belongs. It is about eight miles in length, has a light-house at its north end, and contains New Shoreham, a summer resort.

**BLOCKSBERG**, the name given to various mountains and hills in Germany, but preëminently to the Brocken, the highest of the Harz mountains. According to the popular belief, it is the favorite haunt of the witches, where they celebrate *Walpurgismacht* on the 1st of May. Almost all mountains thus haunted are known to have been famous places of sacrifice in the ages of paganism.

**BLOCK-SHIP**, a ship of war too old or too slow in sailing to render efficient service in action out at sea, but useful as a defense in great ports and naval arsenals. Now as war steamers have come more into use, some of the old sailing men-of-war are nearly valueless except as block-ships. There are at present a great number of English block-ships.

**BLOCK TIN** is an inferior variety of tin. When the metal is reduced from its ores it is first poured into moulds, and the ingots thus procured are heated to incipient fusion in a reverberatory furnace. The pure tin first fuses, and is withdrawn; and the less pure tin, which is left behind, being melted at a higher temperature, is poured into moulds and is known as block tin.

**BLOEMFONTEIN**, the capital of Orange Free State, South Africa, situated on the Modder, 200 miles northwest of Durban. It is connected by telegraph with the Cape and Natal.

**BLOEMAERT, PHILIP**, a prominent Flemish author, born in Ghent about 1809, died there Aug. 14, 1871. In 1834 he published a volume of verse, characterized by much simplicity and earnestness, but so inartistic in form that it met with little success. He rendered better service to literature and to the patriotic cause by the publication (1836-41) of several old Flemish poems of the 12th, 13th and 14th centuries. His most important work is a *History of the Belgians* (1849), in which he attempts to show that the political destiny of the Low Countries has ever been identical with that of Germany, and that it is with the latter country and not with France that Belgium should seek to ally herself.

**BLONDEL**, a celebrated French minstrel of the 12th century, and the favorite of Richard the Lionheart, king of England. A few of Blondel's poems are preserved in the Library of the Arsenal of Paris.

**BLONDIN, EMILE GRAVELET**, born in France about 1830. He is a famous tight-rope walker. He crossed the Niagara River below the falls on a rope 1,300 feet long, which was stretched 150 feet above the water, and has performed other similar feats.

**BLOOD, AVENGER OF**. In the early ages of society it was almost universally looked upon as the duty of the next of kin to avenge the death of a murdered relative; but among some primitive peoples, for example, the modern Bedouins, as among the ancient Anglo-Saxons, the right is an



nulled by compensation. The Mosaic law did not set aside this universal institution of primitive society, but placed it under regulations, prohibiting the commutation of the penalty of death for money, and appointing cities of refuge for the involuntary manslayer. The nearest relative, whose duty it was to hunt down the murderer, was called *Goel*, the "redeemer" or "avenger."

**BLOOD-BIRD, or SOLDIER-BIRD** (*Myzomela sanguinolenta*), a beautiful little species of honey-sucker. The head, breast and back of the male are of a beautiful scarlet color. It inhabits the thickest of New South Wales and also of Bengal. See *Britannica*, Vol. XII, p. 139.

**BLOOD, EATING OF.** The eating of blood was prohibited under the Old Testament dispensation, obviously for reasons connected with the use of animals for sacrifice.

**BLOOD-FLOWER** (*Haemanthus*), a genus of bulbous-rooted plants of the natural order *Amaryllidaceae*, mostly natives of South America. The beautiful red flowers form a fine cluster. The fruit is a berry, usually with three seeds; the leaves are almost linear in some and round or erect in others. The species of blood-flower generally possess poisonous properties. The inspissated juice is used by the natives of South America for poisoning their arrows.

**BLOOD-MONEY**, a reward for bringing about the death of another, as by giving evidence leading to a conviction in a capital charge. The name is also applied to the compensation formerly, and still in some countries, paid to the next of kin for the slaughter of a relative.

**BLOOD OF OUR SAVIOUR**, an order of knighthood in Mantua, instituted by Duke Vincent Gonzaga in 1608. It consisted of 20 knights. The collar had threads of gold laid on fire, and interwoven with the words *Domine probasti*. To the collar were pendent two angels, supporting three drops of blood, and circumscribed with the motto, *Nihil isto triste recepto*. The name originated in the belief that in St. Andrew's Church, in Mantua, certain drops of our Saviour's blood are kept as a relic.

**BLOOD-WORM**, a name given to the abundant aquatic larva of a gnat-like dipterous insect known as *Chironomus plumosus*. It has a worm-like appearance, a blood-red color, and is found in stagnant water.

**BLOOM**, an appearance on paintings resembling in some measure the bloom on fruit, such as peaches, plums, etc., produced, in all probability, by the presence of moisture in the varnish, or on the surface of the painting when the varnish is laid on. The bloom often destroys the transparency, and is consequently injurious to the general effect of the picture.

**BLOOMER, AMELIA JENKS**, born in Homer, N. Y., May 27, 1818. She was the wife of Dexter C. Bloomer, a lawyer of Seneca Falls, N. Y. She has been a writer on enfranchisement of women, and lectured on this subject and on temperance. She published a paper, "The Lily," in 1849, which advocated her views, and in 1853, she continued its publication in Mt. Vernon, Ohio, whither she and her husband had removed. They went to live at Council Bluffs, Iowa, and she sold the paper to Mary B. Birdsall. She adopted and advocated the

Bloomer costume (consisting of a skirt reaching to the knees, and Turkish drawers), which was originated by Gerrit Smith's daughter, Mrs. Elizabeth Smith Miller. She formerly took an active part in the woman suffrage movement in Iowa and Nebraska, but has entirely withdrawn from public life of late years.

**BLOOMER COSTUME**, a dress or costume for women which arose out of an agitation for the reform of female attire. In 1849 Mrs. Bloomer adopted the costume to which she has given her name, and lectured in New York and elsewhere on its advantages. The Bloomer dress consisted of a jacket with close sleeves, a skirt falling a little below the knee, and a pair of loose trousers buttoned round the ankle. Though a few ladies followed the example of Mrs. Bloomer, the dress was never popular. Dress reform societies and private persons have from time to time advocated changes in the costume of women less radical than Mrs. Bloomer's, and the "divided skirt" has still its supporters.

**BLOOMFIELD**, a city of Iowa, county-seat of Davis county, beautifully situated on an elevated prairie about 85 miles west of Burlington. It is the trade center of a fertile agricultural district, enjoys excellent educational facilities, and contains important manufactures of furniture, plows and wagons.

**BLOOMFIELD**, a manufacturing town of New Jersey, situated on the Morris Canal, about five miles northwest of Newark. It contains a cabinet-organ factory, an iron foundry and manufactures of paper and woolen goods.

**BLOOMINGTON**, a city of Illinois, capital of McLean county, situated nearly in the geographical center of the State and surrounded by one of the richest agricultural regions in the world. Four great trunk lines of railway furnish an outlet in every direction. The city is located on the highest land in the State, and its systems of sewerage, gas and water-mains are very extensive. The streets are wide, lined with trees, and well lighted with gas and electricity. Electric street cars radiate from a central point to all parts of the city. The water supply is from subterranean sources, which furnish daily 2,500,000 gallons. The water is strongly impregnated with iron, and high claims are made for its healthfulness.

Bloomington carries on a large wholesale trade, and its manufacturing industries are numerous. The Chicago & Alton Railroad shops are located here, and employ over 2,000 men. The city is handsomely laid out, and has two well-kept parks. The means of education are ample, there being numerous public and private schools, and a large public library. The Illinois Wesleyan University was founded here in 1857. The Major Female College and the Roman Catholic Academy are also located in the city, while at Normal, two miles distant, is the State Normal University, organized in 1857, with an edifice costing \$200,000. The State Soldiers' Home is also located at Normal. The population of Bloomington was, in 1880, 17,180; in 1890, 22,242.

**BLOOMINGTON**, a city of Indiana, county-seat of Monroe county, situated about 55 miles southwest of Indianapolis. It is the seat of the Indiana State University, and contains extensive manufactures of woolen goods, staves and leather. There are also important manufactories of hard wood, and in the vicinity are extensive quarries of limestone.

**BLOOMSBURG**, a flourishing railroad town of Pennsylvania, 56 miles southwest of Scranton, situated on Fishing Creek. It contains 10 churches, three banks, iron furnaces and foundries; it is the



HONEY-EATER.

seat of a State normal school, and the county-seat of Columbia county.

**BLOUSE**, a name borrowed from the French for a loose, sack-like over-garment. In England it is worn by wagoners and farm-laborers, and is called smock-frock. In the south of Scotland it is sometimes worn by butchers, and is then blue, as in Germany and France. In Germany it is frequently tightened to the body by a belt, and sometimes made of coarse woolen. France is preëminently the country of blouses. There they are worn universally, not only by the country people, but also by the laboring classes in towns, not excepting Paris; and so characteristic is this garment that the French populace are often called the "blouses." The white blouse is Sunday dress with the working class in France. In America it is a coat made of any material, as for instance the undress uniform of the United States army.

**BLOW-FLY**, a two-winged insect, of the order *Diptera*, and of the large family *Muscides*. Its body is hairy, the face silky and yellow, the thorax gray with three black stripes, the abdomen brown with glittering yellow spots. The eyes are widely separate in both sexes. The eggs are often hatched within the body of the parent, and its larvæ are found feeding upon meat, sometimes upon live worms, and too often upon sheep.

**BLOW-PIPE AND ARROW**, a kind of weapon much used by the Indians of South America, both in war and for killing game. It consists of a long straight tube, in which a small poisoned arrow is placed, and forcibly expelled by the breath. The tube or blow-pipe is eight to 12 feet long, made of reed, or the stem of a small palm. In the hand of a practiced Indian it is a deadly weapon, especially when directed against birds in the tops of high trees. As the weapon makes no noise, the hunter often empties his quiver before he gathers his game.

**BLUEBEARD**, the name given to the hero of a well-known tale of fiction, which is of French origin. According to this romance the chevalier Raoul has a blue beard, from which he gets his designation. The historic original of Chevalier Raoul appears to be Giles de Laval, Lord of Raiz, who was marshal of France in 1429, and fought valiantly in defense of his country when invaded by the English; but his cruelty and wickedness seem to have eclipsed even his bravery, as he is remembered chiefly for his crimes, which tradition has painted in the blackest and most fearful colors. Laval was burned alive in a field near Nantes in 1440.

**BLUE BIRD** (*SIALIA*, or *SYLVIA SIALIS*), a favorite American bird, displaying great confidence and familiarity in approaching the habitation of men, and in its general manner resembling the robin. The upper parts of the blue-bird are of a beautiful sky-blue color, the throat and breast are a reddish chestnut and the belly white. Its song is "a soft agreeable warble." It lays five or six pale blue eggs, and has two or three broods in the season.

**BLUEBELL**, the popular name of several different plants. In England the name is given to the common wild hyacinth, *Scilla nutans*. The Scottish bluebells are flowers of *Campanula rotundifolia*, commonly called harebell elsewhere. The term is also occasionally applied to other plants having blue bell-shaped flowers.

**BLUE-BOOKS**, the name popularly applied to the reports and other papers printed by order of the British Parliament, because they are usually stitched up in blue covers. The practice of printing and to some extent publishing, the proceedings of the House of Commons, began in the year 1681,

when disputes ran high on the question of excluding the Duke of York from the succession to the throne. It was stated that false accounts of the transactions were circulated, and it was decided as a remedy that the proceedings of the House be printed. The documents printed by the House of Commons accumulated gradually in bulk and variety until now the blue-books of a session, when collected and bound up, fill many thick folio volumes. The corresponding official books are yellow in France, white in Germany and Portugal, green in Italy, and red in Spain. In the United States the term is applied to a book containing the names and salaries of all the persons in the employ of the Government.

**BLUE-BOTTLE FLY** (*Musca vomitoria*), an insect of the same genus with the common house-fly. The head is black, with rust-colored cheeks, the thorax grayish, the abdomen blue, with a whitish shimmer, and with three black bands. The expanse of wings is nearly one inch, and it flies with a loud buzz. It is abundant throughout Britain and Europe. *M. erythrocephala* is also called blue-bottle.

**BLUE-COAT SCHOOL**, the name usually given to Christ's Hospital—a school in London founded by Edward VI—where the boys wear the ancient costume, of which a blue coat or gown forms a part.

**BLUE-EYE** (*Entomyza cyanotis*), a beautiful little bird of New South Wales. A species of honey-sucker, it seeks its food among the blossoms and small leafy branches of the eucalypti. Numbers are often seen hanging in clusters at the extreme ends of the branches, bending them down with their weight.

**BLUEFISH** (*Pomatomus saltatrix*), a fish of the family *Pomatomidae*, also called *Blue-snapper* and *Skipjack*. It is of compressed subfusiform shape, having two dorsal fins, the first of which is small, and two deeply-hidden spines in front of the anal fin. The upper parts are of a bluish color, the lower parts whitish. It sometimes attains a length of three feet, though it is usually much smaller. It is very swift, strong and voracious, preying on other fishes, of which it destroys many more than it really needs for food. Though found in many seas, it is best known along the Atlantic coast of the United States. Its flesh is much esteemed for the table. See *Britannica*, Vol. IX, p. 267.

**BLUE-GOWNS**, a name commonly given to a privileged class of mendicants in Scotland, whose proper designation was the king's beadsmen—the persons employed to pray for the king having gradually degenerated into a class of authorized paupers. Each beadsmen on the king's birthday received a gown of blue cloth, with a loaf of bread, a bottle of ale, and a leathern purse containing a penny for every year of the king's life. The most important part of the privilege was a pewter badge, attached to the breast of the gown, with the bearer's name and an inscription, *Pass and Repass*. This conferred the privilege of begging, and bespoke the kindly consideration of all to whom the beadsmen appealed for alms or a night's lodging. The practice of appointing beadsmen was discontinued in 1833; at that time there were 60 on the roll.

**BLUE GRASS**, the name of several species of *Poa*, a permanent grass found in Europe and North America. The blue grass of Kentucky, *P. pratensis*, is highly valued for pasturage and hay. It is also called June grass. The blue grass of England is *P. compressa*.

**BLUE-JAY** (*Cyanocitta cristata*), a common North American bird of the crow family. It is about 12 inches long, with a fine crest; the color is purplish-blue above, black on the neck and purplish-gray



below, the tail and wings blue spotted with black and white. It is a mischievous bird, but devours large numbers of injurious caterpillars. The common blue-jay has a wide distribution, and there are several other North American species. The long-tailed blue-jays belong to a rarer genus (*Xanthura*), found in Central and in South America. See *Britannica*, Vol. XIII, p. 611.

BLUE LAWS, once commonly believed to have been made by the colonial legislature of New Haven, were supposed to have prescribed unwarrantable rules for the dress, the private life, and the religious conduct of the colonists. It is certain, however, that no legal code of this description ever existed. The term itself, which is of uncertain origin, probably represented, in the minds of the people of various parts of colonial New England, the undue interference of the judges in the private affairs of citizens. It is said that Samuel Peters, D.D., in his *General History of Connecticut*, published in England in 1781, originated the story of the so-called blue laws of the New Haven colony.

BLUE LICK SPRINGS, a village and watering place of Kentucky, situated on Licking River, about 50 miles northeast of Lexington. It is noted for the medicinal virtues of its saline mineral springs.

BLUE MOUNTAINS, the name of a branch of the dividing range, New South Wales, which runs very nearly parallel with the coast, about 80 miles inland. It was not till 1813 that a practicable passage was found over them into the Bathurst plains. The highest point of the Blue mountains, Mount Beemarang, is 4,100 feet high, and some parts of the road which crosses them are 3,400 feet above the sea.

BLUE PILL, the most simple form in which mercury can be administered internally. It consists merely of two parts of mercury rubbed up with three parts of conserve of roses, till globules of mercury can no longer be detected. To this is added powdered licorice-root, so that a pill of five grains contains one grain of mercury. When taking blue pills all sudden changes of temperature should be avoided; and neither they nor any other form of mercury should be given without good cause, and without the greatest caution.

BLUE RAPIDS, a city of Kansas, situated on the Big Blue River, at the mouth of the Little Blue, about a hundred miles west of Atchison. A developed water-power of nearly two thousand horsepower drives extensive manufactories of flour, woolen goods, oil, and paper; and in the vicinity are valuable beds of water-lime and gypsum.

BLUE RIBBON, a term applied to any great prize—as the “Derby” stakes—from the blue ribbon worn by knights of the garter. *Blue Ribbon Army* was the name adopted, from the badge, by the association of total abstainers known as the Gospel Temperance Union.

BLUE RIDGE, the most easterly range of the Alleghenies, U. S. It forms the continuation of the chain called South Mountain in Pennsylvania and Maryland. It is known as the Blue Ridge till it crosses the James River; thence to North Carolina as Allegheny Mountain; and in North Carolina again as Blue Ridge.

BLUE STOCKING, a name given to learned and literary ladies. The name is derived from a literary society formed in London about 1780, which included both men and women. A gentleman named Stillingeet, who was in the habit of wearing blue stockings, was a distinguished member of the society. The name has also been adopted in Germany and France.

BLUE SULPHUR SPRINGS, village and health resort of West Virginia, situated in Greenbrier

county. It is celebrated for the curative properties of its saline chalybeate waters.

BLUE-THROAT, or *SYLVIA SUECICA*, a handsome bird, somewhat larger than the robin. The upper part of its neck is of a brilliant blue, with a pure white spot in the center; below the blue is a black bar, then a line of white, and then a broad band of bright chestnut. In Lorraine and Alsace great numbers are caught for the table, and esteemed a delicacy. It has a very sweet song, and because it imitates to an unusual degree the notes of other birds the Laplanders gave it a name signifying the bird of a hundred tongues.

BLUE-WING, the blue-winged teal of North America, *Querquedula discors*, a small duck with blue wing-coverts. No member of the duck tribe is in higher esteem for the table.

BLUFFTON, a village of Indiana, county-seat of Wells county, situated on the south bank of the Wabash, about 25 miles south of Fort Wayne. It contains important manufactories of flour, woolen goods, barrels, barrel staves and heads, lumber, corn-planters and other machines, and a number of planing-mills and foundries. Bluffton enjoys excellent educational facilities, and is extensively engaged in trade in lumber, stock and grain.

BLUM, ROBERT, a German journalist and political agitator, born at Cologne in 1830, shot at Vienna, Nov. 9, 1849, for assisting in the uprising of the people in October. He was a man of strong character and his execution caused much indignation among the democrats in Germany.

BLUNDERBUSS, a kind of short musket with a very wide bore, sufficient to take in several shot or bullets at once. It has a limited range, but is very destructive at close quarters. As a military weapon it is chiefly of service in defending passages door-ways, etc. Some of the English and German troopers of the 17th century were armed with the blunderbuss.

BLUNTSCHLI, JOHANN KASPAR (1808–81), Swiss jurist, born March 7, 1808, at Zurich, where in 1833 he became professor in the newly-founded University. He took an active part in the political struggles of his country, and in 1839 joined the Conservatives, of whom he was for a time an active leader. He was a councillor of state and became a member of the government and of the federal directory, and afterwards worked for the formation of a moderate Liberal-Conservative party in Switzerland. In 1848 he went to Munich as professor of civil and international law. There he published his *Allgemeines Staatsrecht* (5th ed., 1876), on which his reputation as a jurisconsult chiefly rests; *Deutsches Privatrecht* (3d ed., 1864); and, in conjunction with Arndts and Pözl, *Kritische Ueberschau der Deutschen Gesetzgebung und Rechtswissenschaft* (6 vols., 1853–58). In 1861 he removed to Heidelberg University, and became a privy councillor of Baden, actively forwarding all liberal measures in the state. Liberty in ecclesiastical matters he had equally at heart; he acted several times as president of the *Protestantenverein*, and it was after delivering a closing speech at the general synod of Baden that he died suddenly at Karlsruhe, Oct. 21, 1881. He was the author of valuable histories of Zurich and of the Swiss Confederation, and of a number of works on law, being especially an authority on international law.

BOARDMAN, GEORGE DANA, born in Livermore, Me., Feb. 8, 1801, died in Burmah, Feb. 11, 1831. He was a clergyman's son, was a graduate of Waterville College, Me., and Andover Seminary, became a Baptist missionary and labored from 1825 to 1831 in Burmah. He overtaxed his strength and died from

consumption. His widow, Sarah Hall, married Dr. Adoniram Judson.

**BOARDMAN, GEORGE DANA**, son of the foregoing, born in Burmah, Aug. 8, 1828, graduated at Brown and then at the Newton Theological Institution. He became pastor of a Baptist church at Barnwell, S. C. His views on slavery led him to come North, where he became pastor of the Second Baptist church in Rochester, N. Y., and afterwards pastor of the First Church in Philadelphia. He has published books, sermons and addresses.

**BOARDMAN, HENRY AUGUSTUS**, born at Troy, N. Y., Jan. 9, 1808, died in Philadelphia, Pa., June 15, 1880. He graduated at Yale with highest honors, and in 1830 completed the course at Princeton Theological Seminary. He became pastor of the Tenth Presbyterian church in Philadelphia, and held the office from 1833 to 1876, when he was made pastor emeritus. He was the author of a large number of books.

**BOBCAYGEON**, an important lumbering town of Ontario, situated on an island which divides Sturgeon Lake from Pigeon Lake, about eighteen miles north of Lindsay. A canal passing through the village connects the lakes, and steamers ply regularly between Bobcaygeon and Lindsay.

**BOBOLINK**. See *Britannica*, Vol. XVIII, p. 53.

**BOB-WHITE**. See under *QUAIL*, *Britannica*, Vol. XX, pp. 146, 147.

**BOCCARDO, GIROLAMO**, born at Genoa, Italy, in 1829. He is one of the most voluminous and versatile writers of his age and nation. His writings include important works on political economy, geography, statistics, and history. See *POLITICAL ECONOMY*, *Britannica*, Vol. XIX, p. 387.

**BODIE**, a village of California, situated at an altitude of 8,320 feet, on a spur of the Sierra Nevada mountains, about a hundred miles south of Carson City. It was named from William Bodey, who discovered gold here in 1859. It is one of the most important gold-mining towns of the West.

**BODLE**, an ancient Scotch copper coin first issued under Charles II, and worth at that time two pennies Scotch, or one-sixth of an English penny; said to have been so called from the name of a mint-master of the name of Bothwell.

**BODMER, KARL**, an artist, born in Zurich, Switzerland, in 1805. He resides in Paris and Germany, where he paints landscapes and animal life. He spent two years in America, 1833-35, in the company of Prince Maximilian of Wied, and made sketches of Indians and forest scenes, which he has since utilized, and which have become exceedingly valuable; no artist of equal skill having up to that period visited the country west of the Mississippi.

**BODY-CAVITY**, in zoology, the general or common cavity of the body; the space inclosed by the body-walls of an animal. Special cavities, or those of particular organs, acquire special names.

**BODY-COLOR**, a term applied to such pigments as have body enough to be opaque, as distinguished from those which are transparent. As a general rule, pigments have more body the nearer they approach to white; consequently, the light parts of pictures in oil are in body color to give them brightness and strength, while the dark parts are transparent to give them depth. In water-color painting, works are said to be executed in body-colors when, instead of proceeding by transparent tints and washes, the pigments are mixed with white and thus rendered opaque.

**BODY'S ISLAND**, a long, narrow strip of sand, off North Carolina, with a light-house (156 feet), the highest in the United States.

**BOECKH, AUGUST**, a German antiquarian, born at Karlsruhe in 1785, died in 1867. He became professor of oratory and ancient literature at Berlin in 1810. He was one of the founders of the modern school of Greek historians, and his works are a vast storehouse of information concerning the industrial, social and domestic life of the ancient Greeks.

**BOEHLER, PETER**, a Moravian bishop, born at Frankfort-on-the-Main in 1712, died in London in 1775. He was the founder of *Nrzureth*, a Moravian village of Pennsylvania. He is also well known in Methodist history for the decisive impulse given by him to the career of John Wesley.

**BEHM, THEOBALD** (1802-81), a Bavarian musician, known as the inventor of important improvements in musical instruments, especially the flute. The Boehm flute is recognized as the best model for orchestral use, being more easily fingered and more even and accurate in tone than the common flute.

**BEHMERIA**, a genus of the natural order *Urticaceæ*, of which the most important species, *B. nivea*, a shrubby plant of China and the East Indies, affords the valuable rhea-fiber or grass-cloth fiber. It has been successfully cultivated in the United States. The pyha fiber of the Himalayas is derived from *B. puya*, now referred to the genus *Maoutia*.

**BOERNE**, a village and health resort of Texas, county-seat of Kendall county. It is pleasantly situated on the Rio Cibolo, about 30 miles northwest of San Antonio. The climate is genial, and the surrounding country is fertile and very picturesque.

**BOGARDUS, JAMES**, an American inventor, born in Catskill, N. Y., March 14, 1800, died in New York city, April 13, 1874. He was apprenticed to a watchmaker, and early showed the bent of his mind by improvements in the construction of eighth-day clocks, and by the invention of a delicate engraving machine. The dry gas-meter is his invention, as is also the transfer machine to produce bank-note plates from separate dies; and in 1839 his plan for manufacturing postage stamps was accepted by the British government. He subsequently introduced improvements in the manufacture of India-rubber goods, tools, and machinery, and invented a pyrometer, a deep-sea sounding machine, and a dynamometer. In 1847 he erected a factory in New York entirely of cast-iron, five stories high, which was the first of the kind ever built, and his success led him to engage in the erection of similar structures in other places.

**BOGERMANN, JOHANN** (1576-1633), the president of the famous Synod of Dort, born in 1576 at the Frisian village of Oplewert. After studying at Heidelberg and Geneva, he became pastor at Leeuwarden, and soon distinguished himself by the active part he took in the religious controversies of his time, especially that against Arminius. In 1618 he was elected president of the Synod of Dort, but his name is now remembered for the translation of the Bible into the vernacular, mainly by him, which soon became the standard Dutch version. He died in 1633, at Franeker, where he was primarius professor of divinity.

**BOGGS, CHARLES STUART**, a rear-admiral of the United States navy, born in New Brunswick, N. J., in 1811, died in 1888. He is distinguished as the commander of the *Varuna* during the passage of Forts Jackson and St. Philip and the taking of New Orleans in 1862.

**BOGLIPOOR**, or *BHAGULPORE*, a populous trading city in Bengal, India, situated on the right bank of the Ganges and distant by rail 265 miles from Calcutta. The city has an English seminary, silk



manufactories, several mosques and two unique circular towers of unknown origin.

**BOGENHAUSEN**, the site of the Royal Observatory of Munich. It is a village situated on the Isar, about two miles from that city.

**BOGOS**, a tribe of negroes who inhabit the highlands north of Abyssinia. They are estimated to number about 10,000. They are nominal Christians and are tributary to Abyssinia.

**BOHTLINGK**, Otto, Sanskrit scholar, born of German ancestry at St. Petersburg. From 1835 to 1842 he studied oriental languages, especially Sanskrit, at Berlin and Bonn, and, after 26 years in his native city, settled in 1868 at Jena. Among his valuable works are the first European edition of the Indian grammarian Panini (1839), a Sanskrit chrestomathy (1845; 2d ed. 1877), and a great Sanskrit dictionary (7 vols., 1855-75).

**BOIS DE BOULOGNE**, a celebrated park, situated on the right bank of the Seine, about three miles west of Paris. It is the favorite rendezvous of the *élite* of that city and of its devotees of fashion and splendor. It suffered serious mutilation by fire and the axe during the siege of Paris in 1870.

**BOISE CITY**, the principal commercial city of Idaho, capital of the State, and county-seat of Ada county, beautifully situated on the Bois  River, at the head of the fertile valley of the Snake River, about 60 miles above the confluence of those streams. It is the trade center of an important mining region, and of a rich agricultural and grazing country. It contains a United States assay office, and gold is the chief article of export. There is also a penitentiary, and several manufactories, principally for flour and lumber. The altitude of Boise City is nearly 3,000 feet, and its climate is mild. The town was settled in 1863. It was incorporated as a city in 1865. In the latter year it became the capital of Idaho, which was admitted as a State in 1890.

**BOISE-DUVAL**, JEAN, an eminent French physician and naturalist, born at Ticheville in 1801. He has published many valuable works on botany and entomology, and was noted for his valuable professional services during the cholera epidemic of 1835.

**BOISSY D'ANGLAS**, FRANCOIS ANTOINE, COUNT, French statesman, born at St. Jean Chambre, in Ard che, in 1756, died in Paris, Oct. 20, 1826. He was for some time major-domo to the Count of Provence (Louis XVIII), and a member of the States-general. During the Reign of Terror, fear of the "Mountain" kept him quiet; but, yielding to the solicitations of Tallien and Bar re, he joined the conspiracy against Robespierre. Two months after the execution of the tyrant he was elected secretary of the Convention, and shortly afterward a member of the Committee of Public Safety, in which capacity he displayed remarkable talent and discretion. He was subsequently president of the Council of Five Hundred; was called into the Senate by Napoleon, and was made a peer by Louis XVIII.

**BOIVIN**, MARIE (1773-1841), French midwife. She became a nun, but after the destruction of the nunnery at the Revolution, she devoted herself to midwifery. So distinguished was she as superintendent of the Maternity at Paris, that the king of Prussia conferred an order on her, and Marburg University the degree of M. D.

**BOJADOR**, CAPE, a headland on the west coast of Africa, in 26  7' north latitude, 14  29' west longitude. The Portuguese doubled this cape in 1482.

**BOJANO**, an ancient Italian town with a cathedral, situated on the Biferno, 13 miles southwest of Campobasso. Population, 3,506.

**BOKER**, GEORGE HENRY, author and diplomatist, born in Philadelphia Oct. 6, 1823, died there Jan. 2, 1890. After graduating at Princeton, he studied law and traveled in Europe; on his return wrote poems and plays, several of the latter being brought out successfully. Under Grant he served as minister to Turkey and also to Russia, and, returning in 1878, was elected president of the Union League, which, in 1862, he had helped to form. This position he occupied until his death.

**BOKHARA**, a Russian vassal state adjoining Turkestan and Afghanistan. Area, about 92,000 square miles; population, about 2,500,000; capital, Bokhara, with a population of 70,000.

The reigning sovereign is the Ameer Sayid Abdul Ahad, fourth son of the late Ameer, by a slave-girl; born about 1860; educated in Russia; succeeded his father in 1885.

The modern state of Bokhara was founded by the Usbeks in the fifteenth century, after the power of the Golden Horde had been crushed by Tamurlane. The dynasty of Manguts, to which the present ruler belongs, dates from the end of the last century. In 1873 a treaty was signed, in virtue of which no foreigner was to be admitted to Bokhara without a Russian passport, and the state became practically a Russian dependency.

*Ameers of Bokhara*.—Sayid Ameer Hyder, 1799-1826; Mir Hussein, 1826; Mir Omar, 1826-27; Mir Nasrulla, 1827-60; Muzaffar-ed-Din, 1860-85.

Karshi has a population of 25,000, and Hissar 10,000. The religion is Mohammedan.

The Ameer has 25,000 troops, of which 4,000 are quartered in the city. A proportion of the troops are armed with Russian rifles and have been taught the Russian drill.

Bokhara produces corn, fruit, silk, tobacco, and hemp; and breeds goats, sheep, horses, and camels. The yearly produce of cotton is said to be about 32,000 tons; of silk 967 tons. Gold, salt, alum, and sulphur are the chief minerals found in the country. The exports of raw silk to India in one year are estimated at 34 tons. The exports of cotton in 1888 were 122,000 bales. By the treaty of 1873 all merchandise belonging to Russian traders, whether imported or exported, pays a duty of 2½ per cent. *ad valorem*. No other tax or import duty can be levied on Russian goods, which are also exempt from all transit duty. The Ameer has forbidden the import of spirituous liquors, except for the use of the Russian embassy.

The Russian Trans-Caspian Railway now runs through Bokhara from Charjui, on the Oxus, to a station within a few miles of the capital, and thence to Samarkand; the distance from Charjui to the Russian frontier station of Katti Kurghan being about 186 miles.

There is a telegraph line from Samarkand to Bokhara, the capital.

Russian paper roubles are current everywhere.

**BOLAS** (Spanish, "balls"), missiles used by the natives and *gauchos* of southern South America, and consisting of two heavy balls, generally of stone covered with leather, connected by a plaited thong 6 to 8 feet long. One bola is held in the right hand, while the other is swung rapidly round the head, at the full extent of the thong, and both are discharged at the animal to be captured, so as to wind round its feet and bring it to the ground. In another form of bolas there are three balls, differing in size, connected at the common center by three short thongs or ropes.

**BOLERO**, a Spanish national dance, invented in 1780 by the dancer Sebastian Zerezo. It is danced in moderately quick three-quarter time by two persons to the accompaniment of the castanets and

the guitar. The name is also applied to the air to which it is danced. Like the *fandango*, it is said to be originally a refinement of an African dance still performed by the Congos under the name of *chika*.

**BOLETUS**, a genus of hymenomycetous fungi. Most of the species resemble the common mushroom and other species of *Agaricus* in general form, but are distinguishable by the pore-like surface occupying the place of gills. It is generally found growing on the ground in woods and meadows, especially in pine woods, and in moist, warm seasons it sometimes appears in prodigious quantities. Some of the species are edible.

**BOLGRAD**, a town in the Russian province of Bessarabia, 28 miles northwest of Ismail, at the head of Lake Yapuch. It is well built, and has some trade and manufactures of soap, candles, pottery, etc. Population, 7,530.

**BOLIVAR**, a village of Missouri, county-seat of Polk county, about 80 miles north of Springfield. It contains important manufactories, principally of cotton, wool and flour.

**BOLIVAR**, a village of Tennessee, capital of Hardeman county. It is situated on Hatchee River, at the head of navigation, about 30 miles south of Jackson: It is the seat of St. James Female College and of a number of academies, and the center of trade of a rich cotton and lumber region. It has an extensive water-power, and contains various prosperous manufactories.

**BOLIVIA**, a South American republic. Area, about 770,000 square miles; population, 2,191,891; capital La Paz, with a population of about 26,000. For history and productions, see Britannica, Vol. IV, pp. 10-18. Bolivia has no sea-port; its former port, Antofogasta was ceded to Chili in 1884. It was formerly comprised in the Spanish viceroyalty of Colombia under the name of Peru, and derives its name from its great liberator, Simon Bolivar. In the war against Chili in 1879 it equipped an army of about 6,000 men.

The mineral productions of Bolivia are very valuable; the silver mines of Potosi are believed to be almost inexhaustible. While gold, partly dug and partly washed, is obtained on the Eastern Cordillera of the Andes; copper, lead, tin, salt, and sulphur are also found. Its agricultural produce consists chiefly of rice, barley, oats, maize, cotton, cocoa, indigo, india-rubber, coca, potatoes, the choicest fruits, cinchona bark, medicinal herbs, etc., which are also its principal exports; its chief imports being iron, hardware, and silks.

Public revenue, 1897-98..... \$ 3,766,425  
Public expenditure, 1897-98..... 4,477,115  
Debt (1898), interior, \$8,833,140; foreign, \$8,173,750... 12,006,890

The constitution of Bolivia was adopted in 1826, but has received various amendments. Its chief executive (President) is elected in the same years and for the same term as the President of the United States, and by universal suffrage. Two vice-presidents are elected with him, and he is assisted by a council or cabinet of five ministers. The congress consists of a senate and house of representatives, elected by universal suffrage. There are nine departments, each having a governor nominated by the President.

**BOLKHOV**, a cathedral city of Russia, on the River Nugra, 37 miles north of Orel. It manufactures leather, gloves, hosiery and soap, and has an active trade in tallow, hemp, oil, fruit, and vegetables. Population, 26,395.

**BOLL**, a measure for grain, etc., used in Scotland and the North of England. In Scotland it is equivalent to six imperial bushels, but in England it varies from that to two bushels—the "new boll." It

is also a measure of weight, containing, for flour, 10 stone (equal to 140 pounds).

**BOLOGNA STONE**, or **BONONIAN STONE**. In the end of the 16th or beginning of the 17th century, Vincent Casciorolo, a shoemaker of Bologna, made the discovery that the mineral now known as heavy spar (barium sulphate), when reduced to a fine powder, mixed with gum, dried, and strongly heated in a covered crucible, is converted into a substance having the property of shining in the dark. Casciorolo communicated his discovery to the alchemist Scipio Bagatello and the mathematician Maginus, and the latter made the substance famous by the specimens which he sent about. Peter Potier, a French chemist, resident in Bologna, first published a recipe for making it. It was called by its discoverer "capis solaris," but was soon generally called Bologna stone, from the place where it was prepared. Its phosphorescent character depends very much upon its preparation. It shines in the dark only after absorbing light. The now well-known "luminous paint" is composed of this or of similarly prepared sulphides. See LIGHT, Britannica Vol. XIV, p. 603.

**BOLOMETER**, an instrument invented (1881) by Professor Langley, of the United States, for the measurement of the intensity of radiant heat. Its action is based upon the variation of electrical resistance produced by changes of temperature in a metallic conductor. The instrument may be made much more sensitive than a thermopile. It indicates accurately changes of temperature of much less than .0001° F. The bolometer (also called *thermic balance* and *actinic balance*) has been used in the study of the distribution of heat-energy in the solar, lunar, and other spectra.

**BOLSWARD**, an old town of Friesland, 15 miles southwest of Leeuwarden. It has a fine Gothic church. Population, 5,939.

**BOLTON**, SARAH KNOWLES, born in Farmington, Conn., about 1840. She married Charles E. Bolton. She has written much for the press; has been connected with the Boston "Congregationalist;" has been one of the corresponding secretaries of the Woman's National Temperance Union, and has traveled in Europe and studied social questions. Of her books, the *Poor Boys Who Became Famous* and *Girls Who Became Famous* are the best known. She and her son, Charles Knowles Bolton, have published a joint collection of poems.

**BOLUS**, a soft mass of any kind of medicine intended to be swallowed at once. It differs from a pill in being larger. Also used figuratively of an unpalatable doctrine or argument that has to be tolerated.

**BOMBA**, an opprobrious epithet bestowed in Italy on Ferdinand II, of Naples (1810-59), in consequence of his cruel bombardment of Naples, Messina, and other cities of his realm during the revolutionary troubles of 1849.

**BOMBARDIER**, the lowest non-commissioned officer in the British artillery, ranking with corporals in the infantry and cavalry. The name was applied in the 17th and 18th centuries to a man employed about the mortars and howitzers—pieces of ordnance employed in bombarding.

**BOMBARDIER BEETLE**, a name given to several species of beetles, of the genera *Brachinus* and *Aptinus*, in the sub-family *Carabide*. The name refers to their offensive and defensive habit of discharging an acrid volatile fluid with explosive force from the abdomen. Some ants and other insects exhibit the same curious protective device. These beetles are usually found under stones or at tree roots, often in great companies. The larger and more brilliant species are tropical.



**BOMBARDMENT**, a continuous attack upon a fortress or fortified town by means of shot and shell to destroy the fortifications or buildings. It is an especially cruel operation when, as is often the case, it is directed against the civilians and their buildings, as a means of inducing the officer in charge to surrender the place and terminate their miseries. In modern times a bombardment is generally adopted as an adjunct to a siege, and is more frequently a naval than a military operation.

**BOMBAY DUCK**, or **BUMMALOTI** (*Saurus ophiodon*), a fish of the family *Scopelidae*, nearly allied to the salmon and trout family. It is small but voracious, with very large fins, and a mouth the gape of which extends far behind the eyes, and which is furnished with a great number of long slender teeth barbed at the points. It is a native of the coasts of India, particularly of the Bombay and Malabar regions, from which it is exported in large quantities, salted and dried. It is highly esteemed for its rich flavor, and is often used as a relish.

**BOMBAZINE**, a fabric of which the distinguishing characteristic is that the warp is silk and the weft worsted. It is rather fine and light in make, and may be of any color. It was manufactured in England as early as the reign of Elizabeth. The fabric is now little used.

**BOMB LANCE**, a lance-like missile used in whale fishing. It has an explosive head, and is so arranged as to be shot from a musket and to explode within the body of the whale.

**BOMB-PROOFS**, military structures of such immense thickness and strength as to resist the penetration and shattering force of shells. In every fort the barracks, hospital, stores and magazines are covered with masonry and earth, or with thick armor-plates, so as to be impervious to the fire of the most powerful siege-guns and mortars. The most effective shield against modern projectiles is constructed of timber covered and faced with massive embankments of earth.

**BOM JARDIM**, a town of Brazil, beautifully situated in a fertile valley, about 20 miles south of Crato, in the province of Bahia. It contains important manufactories of millstones.

**BOMMEL**, a town in the Dutch province of Gelderland, on the Waal, 20 miles southeast of Utrecht. Population, 4,000.

**BONA DEA**, the good goddess, a Roman divinity who is variously described as the wife, sister, or daughter of Faunus. She was worshiped by the women of Rome from the most ancient times. Her sanctuary was a grotto on Mons Aventinus; but her festival (the 1st of May) was celebrated in the house of the consul. At this celebration no males were allowed to be present; even portraits of men were veiled. The solemnities were generally performed by high-born vestals.

**BONA FIDES**, a Latin expression signifying good faith; without fraud or deception. It enters largely into the consideration of matters of agreement, contract, damage, trusts, and other departments of the law, and in all of them it requires the absence of fraud or unfair dealing. The term is frequently used as a compound adjective in the sense of honest, genuine. *Bona fide* possessor, in law, is a person who not only possesses, but who honestly believes his title good, and is unaware that any person claims a better right. *Bona-fide* purchaser, in law, is one who has bought property and paid for it before receiving any notice of adverse claim, and who has seen no reason to suspect that such claim existed. As a general rule people are supposed to contract with caution, and therefore there is not much room for the doctrine of *bona fides* in consid-

ering business agreements, which depend in the true construction of the documents exchanged. Positive misrepresentation or fraud will, of course, upset a contract if it lead to error; but it is only in certain classes of contracts, such as partnership, suretyship, insurance, etc., that the plea of undue concealment has much force. The amount of damages recovered is sometimes affected by the good or bad faith of the wrong-doer, as in the case of willful trespass of mining boundaries, where the nature of the subject renders a severe check necessary. In trust administrations the beneficiaries are entitled to place much confidence in the trustees, and bad faith on their part is severely dealt with.

**BONANZA** (Spanish, "prosperity"), a term originally applied in the mining territories of the United States to the discovery of a rich vein or "pocket." A mine was said to be *in bonanza* when producing profitable ore. It has since been used of successful enterprises generally, in the sense of a "mine of wealth."

**BONAPARTE**, a village of Iowa, situated on the Des Moines River, about thirty-five miles northwest of Keokuk. It contains an academy, flouring mills, sash, door and blind factories, and one of the largest woolen factories west of the Mississippi.

**BONAPARTE, ELIZABETH PATTERSON**, born in Baltimore, Md., Feb. 6, 1785, died there, April 4, 1879. Her father was a ship-owner, and, next to the Carrolls, the wealthiest man in the State. Miss Patterson and Captain Jerome Bonaparte met at a ball, and their engagement soon followed. Fearing trouble might arise from such an alliance, Mr. Patterson carefully complied with all legal formalities; the contract was drawn up by Alexander Dallas, the ceremony performed by Archbishop Carroll, and witnessed by many distinguished persons. The young couple sailed for Europe in one of Mr. Patterson's ships (March, 1805), and tried to land at Lisbon, but Napoleon I was greatly displeased, and had sent a French frigate to hinder Madame Bonaparte from coming ashore. She was obliged to go to England, where she found a home. Here her son was born. Napoleon I asked Pius VII to dissolve the marriage, but he refused. The imperial council of state granted a divorce, and Jerome gave up his American wife to marry the daughter of the King of Württemberg. By her he had three children. Madame Bonaparte sought by every means to defend her marriage and establish the legitimacy of her son. Her life was very unhappy, as both her son and husband were alienated from her. She spent much of her time in Europe, where her misfortunes attracted sympathy and attention.

**BONAPARTE, JEROME**, King of Westphalia. See Britannica, Vol. IV, p. 30.

**BONAPARTE, JEROME NAPOLEON**, son of Jerome and Madame Bonaparte, was born in Camberwell, England, July 7, 1805, died in Baltimore, June 17, 1870. He was a Harvard graduate; a student of law, but never a practitioner. He married a Miss Williams, of Roxbury, Mass. He never became an American citizen, but cultivated an intimacy with his father and the French court. He left two sons.

**BONAPARTE, JEROME NAPOLEON**, son of Jerome Napoleon, born in Baltimore, in 1832, graduated at the United States Military Academy; served for a short time on the Texas frontier, and in the French army in the Crimean war and the Italian campaign. He was a gallant soldier, and many honors were conferred upon him. His brother, Charles Joseph (born in 1851) graduated at Harvard University and the law school, and practiced law in Baltimore.

**BONAPARTE**, NAPOLEON JOSEPH CHARLES PAUL, Prince de Montfort, generally known as Prince Napoleon (Jerome), and commonly as Plon-Plon, was the son of Jerome Bonaparte, sometime King of Westphalia and younger brother of the great Napoleon. His mother was the Princess Catharine of Württemberg, whom Jerome Bonaparte was forced to marry after the romantic affair with Miss Patterson, of Baltimore, had come to an end. Prince Napoleon was born in exile at Trieste, on the Adriatic, on September 9, 1822, and died at Rome, March 17, 1891.

**BONAR**, REV. DR. HORATIUS, Free Church minister and popular hymn writer, born in Edinburgh, Dec. 19, 1808, died there July 31, 1889. Educated at the High School and University there, he was ordained to the ministry at Kelso in 1837, where he remained for nearly 30 years. He afterward took charge of Chalmers's Memorial Free Church, Edinburgh. For a time editor of the "Christian Treasury," "Presbyterian Review," and "Quarterly Journal of Prophecy," he has published besides more than 20 volumes of a religious character; but is best known as the author of *Hymns of Faith and Hope* (three series, 1857-66), selections from which have found their way into all collections for church use.

**BONARD**, LOUIS, born in Rouen, France, in 1809, died in New York city, Feb. 20, 1871. He came to New York in 1851, and lived a secluded life, in apparent poverty, but at his death willed to Henry Bergh \$50,000 worth of property for the use of the Society for the Prevention of Cruelty to Animals.

**BONASIA**, a genus or sub-genus of gallinaceous birds of the grouse family, comprising the hazel grouse of Northern Europe, and the ruffed grouse of North America.

**BONAVISTA**, a bay, a cape and town on the east coast of Newfoundland. The town is a port of entry, and one of the oldest settlements in the island. Its people are mostly fishermen, but agriculture is also carried on. Population, 2,600.

**BOND**, EDWARD AUGUSTUS, LL.D., born at Hanwell, England, Dec. 31, 1815. In 1838 he became keeper of the MSS. in the British Museum, and in 1878 was appointed principal librarian. He has published catalogues of MSS. and fac-similes of Anglo-Saxon charters in the museum, and among other works, he has edited the *Statutes of Oxford University* (1853), Fletcher's *Russe Commonwealth* and Horsey's *Travels in Russia in the Sixteenth Century* (1856), for the Hakluyt Society, *Speeches in the Trial of Warren Hastings* (4 vols., 1859-61), and *Chronica Monasterii de Melsa*. He has also helped to edit the *Fac-similes* published by the Palæographic Society, of which he is a founder and president.

**BOND**. See Britannica, Vol. XVII, pp. 704-5.

**BONDAGER**, the term applied in the south of Scotland and in Northumberland to a female laborer whom a "hired" or married farm-worker undertakes to supply for the regular field-work on a farm as a condition of his tenancy of his house. She is frequently a member of his own family, or she may be merely engaged and boarded by him. The origin of the bondager system is the want of a sufficient rural population for the field-work of the neighborhood.

**BONDED WAREHOUSES**. The warehousing system lessens the pressure of customs duties by postponing payment of them until the goods on which they are levied are required by the importer, when he pays the duties and the goods are released. Until that time the taxable property is under the supervision of the revenue officers, but no compensation will be made for damage sustained by fire or other accident occurring in the

warehouse. The system in the United States dates from 1846.

**BONDI**, CLEMENTE, an Italian poet, born at Mezzano, in Parma, June 27, 1742, died at Vienna, June 20, 1821. He was educated by the Jesuits, and when still very young was appointed to deliver lectures on rhetoric in the Royal Convent at Parma. Here he produced his first work, *Giornata Villereccia* (1773). For having celebrated in verse the abolition of the Jesuit order he was compelled to fly to the Tyrol. He found a patron in the Austrian Archduke Ferdinand, who appointed him his librarian at Brunn. Later he lived at Vienna. His poems are lyrical, descriptive, satirical, and elegiac, written in pure style and graceful verse.

**BONDS**, interest-bearing of the United States. The public debt of the United States reached its maximum Aug. 31, 1865, and amounted to \$2,844,649,626.56. The non-interest bearing obligations amounted to \$461,616,311, leaving the interest-bearing debt at \$2,383,033,315. On Oct. 31, 1890, the interest-bearing debt had been reduced to \$696,906,902. For full description of the bonds, see DEBT OF THE UNITED STATES in these Revisions and Additions; also Britannica, Vol. XXIII, pp. 780, 784, 828.

**BONE-ASH**, or **BONE-EARTH**, is obtained by the complete combustion of bones in an open furnace, when the oxygen of the air burns away the organic matter or gelatine, and leaves the earthy constituents as a white friable mass, having the semblance of the original bone, but readily reducible to the condition of coarse powder, which is bone-ash. Bone-ash of good quality contains about 80 per cent. of phosphate of lime, and 20 per cent. of carbonate of lime, phosphate of magnesia, soda, and chloride of sodium. Bone-ash is employed to some extent as a source of phosphorus, and in the making of cupels for the process of assaying; but the most extensive use is in the manufacture of artificial manures. See Britannica, Vol. XVIII, p. 815. Many thousands of tons of bones are annually exported from South America to Europe for this purpose; India also contributes a large amount, the Hindoos being prejudiced against the use of bones as manure.

**BONE-BEDS**, the name given by geologists to thin beds or layers which are largely made up of the fragments of bones, or in which bones and teeth occur in conspicuous quantities. One of the best known is the Ludlow bone-bed, in England, near the top of the Upper Silurian. This bed, only a few inches in thickness extends continuously over an area of not less than a thousand square miles and is full of fragments of bones of reptiles, fish, crustaceans, etc. Others are the Bettes bone-bed of the Bradford Coal Measure, the Rhatic bone-bed, and the Tilgate stone of the Wealden series. In the bone-beds of the more recent geological age mammalian remains abound, as in the Suffolk bone-bed of the Coralline area.

**BONER**, ULRICH, one of the oldest German fabulists, was a preaching friar of Berne, and is frequently mentioned in documents of the years 1324-49. His collection of a hundred fables was entitled *Der Edelstein*, and was first printed, with wood-cuts, at Bamberg in 1461. Only two copies now exist. Breiting published a complete edition of the work at Zurich in 1757, under the title *Fabeln aus den Zeiten der Minnesinger*, which supplied materials to Lessing for his studies on the philosophy of fable. A more complete edition was published in 1844 by Franz Pfeiffer as volume IV of *Dichtungen des Deutschen Mittelalters*.

**BONESET**, the popular name of *Eupatorium foliatum*, so called because of its supposed properties



**BONESETTERS**, a class of persons who often possess considerable local reputation for success in the treatment of injuries to the limbs. The name is usually applied to those who have a knack at setting bones, but are not regularly qualified surgeons. As they are ignorant of anatomy and of the signs of disease, they sometimes do immense harm by applying their methods to unsuitable cases; but, without doubt, they have sometimes effected a cure where regular practitioners have failed.

**BONFIRE**, a fire kindled in celebration of some event of public interest, or as a beacon; applied also to any great blazing fire of whatever material. It is usually kindled in some open and conspicuous place, such as a hill-top or public square, or the center of a village green. Such fires were formerly lighted on certain anniversaries, as the eves of St. John and St. Peter, and their origin in the old countries can be traced to pre-Christian times.

**BONGAR**, or **ROCK-SNAKE** (*Bungarus*), a genus of venomous serpents allied to the genera *Elaps* and *Naja*. The species, which appear to be few—only two being certainly known—are natives of the East Indies. *Bongar coruleus* (paraguda) is very poisonous, and has a dark-blue ground color, with narrow white lines in front and cross-rows of spots behind. *Bongar annularis* (pamah), also very poisonous, has black rings on a yellow ground, may be over six feet in length, and is found in Ceylon and China as well as in India.

**BONGARDIA**, a genus of herbaceous plants of the natural order *Berberidæ*, natives of the East Indies. One species (*Bongardi Rauwolfii*) produces tubers which are eaten, boiled or roasted, in Persia; and the leaves of another (*chrysogonum*) have an acid taste, and are eaten as a salad.

**BONHAM**, a city of Texas, county-seat of Fannin county, situated on Bois d'Arc Creek, about 30 miles east of Sherman. It is the trade center of a fertile prairie district, in which great quantities of wheat, oats, corn and other cereals, and more than 25,000 bales of cotton annually, with large amounts of broom-corn and tobacco, are raised. The manufactures include flour, machinery, carriages and wagons, brooms, mattresses and tobacco. Bonham is the seat of Bonham Masonic Female Institute and Carlton and Fannin Colleges.

**BONHEUR**, ROSA, a French artist, born at Bordeaux, March 22, 1822. She received her first instruction from her father, Raymond Bonheur, an artist of merit, who died in 1853. In 1841 she figured for the first time in the Salon, showing a couple of small works—*Two Rabbits* and *Goats and Sheep*—that indicated the department in which she was to attain future eminence. These were followed by a number of finely finished compositions; and in the year 1849 she produced what some consider her masterpiece, *Ploughing with Oxen*, now in the Luxembourg. Her famous *Horse Fair* was the chief attraction of the Salon in 1853. It was purchased in 1887 from the Stewart collection by Mr. Cornelius Vanderbilt for \$53,500, and by him presented to the Metropolitan Museum of Art, of New York. In 1865 she exhibited a large landscape, *Haymaking in Auvergne*. In 1853 she became entitled to the Cross of the Legion of Honor, but because of her sex the decoration was withheld until 1865. During the siege of Paris (1870-71), her studio and residence at Fontainebleau were spared by special order of the then Crown Prince of Prussia. Her success in painting animals has been largely due to her conscientious study of living subjects.

**BONIN**, or (Japanese) **OGASAWARA ISLANDS**, a volcanic group in the Pacific Ocean, 700 miles

southeast of Japan, having an area of 32 square miles. They were discovered by Quast and Tasman in 1639, and were taken possession of for Britain in 1827 by Captain Beechey; but in 1878 the Japanese reasserted their sovereignty, with the view of making them a penal settlement.

**BONINGTON**, RICHARD PARKES (1801-28), painter in oil and water-colors, born at Arnold, near Nottingham, England, Oct. 25, 1801. His father, after many vicissitudes, settled at Calais, and placed his son under the instruction of Louis Francia, the water-color painter. He afterwards studied in Paris—in the Louvre, at the Institute, and under Baron Gros. His water-colors sold rapidly. In 1822 he began to exhibit in the Salon, and received a premium from the *Société des Amis des Arts* for his views of Havre and Lillebonne; and two years later he was awarded a medal at the Salon, when Constable and Copley Fielding were similarly decorated. About this time he began to occupy himself with lithography. A fine collection of his work of this kind is preserved in the printroom of the British Museum.

In 1825 he took up oil-painting, and in that year visited England and Italy, subsequently producing his splendid Venice views of the *Ducal Palace* and the *Grand Canal*, which figured in the Salon of 1827, with his *Francis I and the Queen of Navarre* and his *Henry III Receiving the Spanish Ambassador*. He also exhibited in the royal Academy and the British Institution. His position was at this time fully assured, and commissions came to him in abundance; but having contracted an attack of brain fever from exposure while sketching in the sun, his health failed. He visited London for medical advice, and died there Sept. 23, 1828. Of late years the fame of Bonington has been rapidly increasing, and he is recognized as a most accomplished and original painter of landscape and architectural subjects, as well as of scenes of historical genre. He is especially admired for the purity and brilliancy of his coloring. The Louvre contains several of his studies and an admirable example of his figure-pieces in oil, *Francis I, Charles V and the Duchess d'Etampes*. The National Gallery has the *Piazzetta, St. Mark's, Venice, Sunset*, and three water-colors by the artist.

**BONITO**, a name common to several fishes of the mackerel family (*Scomberidæ*), and to others related to them or supposed to resemble them. The *Euthynnus pelamys*, sometimes called the stripe-bellied tunny, and of the same genus as the tunny, is well known to sailors as an inhabitant of the tropical parts of the Atlantic and Indian Oceans, and as one of the fishes most frequently seen pursuing the flying-fish. It is steel-blue in color, darker on the back, and whitish below; and is marked with four dark longitudinal lines on the belly. Its flesh is not considered wholesome. The *Sarda mediterranea* is the bonito of American fishermen and markets, and the "belted bonito" of books. It is of the same color, but is distinguished by oblique stripes. It is plentiful in the Black Sea, and has been found in the North Sea. Its flesh is esteemed. *Sarda chilensis*, closely related to *S. mediterranea*, occurs in the Pacific Ocean. It is known as "bonito" along the California coast, but also miscalled "Spanish mackerel." *Axius thazard* is of a more uniform blue color, without stripes or bands, and having widely separated dorsal fins. It is the plain bonito of the English, but along the New England coast is called "frigate mackerel." Its flesh is little esteemed when fresh.

**BONNAT**, LÉON JOSEPH FLORENTINE, a French artist, born at Bayonne in 1833. He studied at

Madrid under Frederic Madrazo, and in Paris under Léon Cogniet. He gained the second *Grand Prix de Rome*, and, aided by his friends, went to Italy to study art in 1858, where he remained for four years. He was first brought into notice by his *Adam and Eve Finding the Body of Abel* (1860), now in the gallery at Lille; and his *Pasqua Maria* (1863) was much praised. He devoted himself to Italian *genre* pictures of moderate size, varied by such religious subjects as *The Assumption* (1869), and the realistic *Christ on the Cross* (1874), commissioned for the Palais de Justice, Paris. More recently his works have dealt with Eastern life, and he has produced several remarkable portraits, among others those of M. Thiers and Victor Hugo.

BONNER, ROBERT, an American publisher, born near Londonderry, Ireland, April 28, 1824, of Scotch-Irish parentage. He came to the United States in early youth and learned the trade of a printer; and in 1851 he became proprietor of the "New York Ledger," the subsequent phenomenal success of which is wholly due to his business tact and energy. He has made liberal donations to educational and other institutions, principally to the College of New Jersey at Princeton. He is known as an admirer of fine horses, and as the owner of the celebrated Maud S. and Dexter.

BONNET-PIECE, a Scotch gold coin, so called on account of the king's head being decorated with a bonnet instead of a crown, as was usual. It was first issued in 1539 by James V of Scotland, and worth at the time of issue forty shillings Scotch. James V was the first Scottish sovereign to place dates on his money, and to diminish the size of coins by increasing their thickness. His bonnet-pieces were struck of native gold, and are now much prized by collectors.

BONNEVILLE, NICHOLAS DE, one of the earliest French students of German literature, born at Evreux, March 13, 1760, died Nov. 9, 1828. Among his earlier works are *Nouveau Théâtre Allemand* (12 vols., 1782-85), a collection of German tales, and a translation of Shakespeare. After the Revolution he edited several newspapers, but his moderation and liberality rendered him obnoxious to the ruling party, and he was thrown into prison. His *Histoire de l'Europe Moderne* (3 vols. 1789-92), and his *De l'Esprit des Religions* (1791) are still read.

BONNY, or BONI, a town and river of Guinea, now in the British Niger protectorate. The river forms an eastern debouchure of the Niger, and falls into the Bight of Biafra. It is accessible at all times of the tide to vessels drawing as much as eighteen feet of water, and safe anchorage at all seasons of the year is found within its bar. Its banks are low, swampy, and uncultivated. On the east side near its mouth, is the town of Bonny, notorious from the 16th to the 19th century as the rendezvous of slave-trading ships. The houses forming the town stand in a swamp, where fever prevails; European traders generally take up their quarters on river-boats moored in the current of the Bonny. It exports considerable quantities of palm-oil.

BONOMI, JOSEPH, born in Rome, Oct. 9, 1796, died March 3, 1878. He studied art in London, and became famous as a draughtsman, especially of Egyptian remains. He repeatedly visited Egypt and the Holy Land, and illustrated important works by Wilkinson, Birch, Sharpe, Lepsius, and other Egyptologists. He also published a work of his own on Nineveh.

BONUS, erroneously put for *bonum*, a good thing. It is generally used if an extra dividend given to shareholders of a company from surplus profits; a

portion of the profits of an insurance company distributed among policy-holders. A premium given for a loan, or for a charter or other privilege granted to a company, is also called a bonus.

BONYHAD, or BONHARD, a market town of Hungary, in the county of Tolna, about 150 miles south of Buda-Pesth. It has some trade in corn, wine, and tobacco. Population, 5,970.

BONZE, a modified Japanese word applied by Europeans to the Buddhist priests of Japan and China.

BOOBY (*Sula leucogastra*), see Britannica, Vol. X, p. 71, a species of gannet, which has received this name from its apparent stupidity. Accounts vary very much, however, as to this characteristic of the booby, some representing it as singular in not taking alarm nor becoming more wary even when it has had reason to apprehend danger from man; while others, as Audubon, assert that it does learn to be upon its guard, and even becomes difficult to approach. The booby is not quite so large as the common gannet; is of a blackish-brown color beneath, and the sexes differ very little, except that the female is not quite so large as the male. It feeds upon fish, and the expansibility of the gullet enables it to swallow those of considerable size. The booby is found on almost all tropical and sub-tropical shores, and sometimes even 200 miles from land. On the east coast of North America, it reaches as far north as Cape Hatteras, but is much more abundant farther south. The flesh of the booby, although sometimes eaten by sailors, is dark colored, and not very agreeable.

BOOBY ISLAND, a level rock in Torres Strait, in 10° 36' south latitude, and 141° 53' east longitude, 3 feet above high water, and  $\frac{1}{4}$  mile in diameter. Being dangerous to navigators, and destitute of resources of its own, it is pretty regularly supplied with provisions and water by passing vessels, for the benefit of shipwrecked sailors.

BOOK-LICE, various small insects which damage books. In the family *Psocidae*, in the order *Orthoptera*, there are numerous minute wingless insects which shelter in books and among papers, and do especial damage to collections of insects. One of them (*Atropis pulsatorius*), long credited with being the *Death-watch*, is very destructive to old books, especially in damp places, and to collections of dried plants, etc. The closely allied *Troctes divinatorius* is a yet commoner pest of entomological cabinets. Among beetles, too, in the wood-boring family (*Xylophaga*), *Ptilinus pectinicornis* is known to attack books with wood in the binding.

BOOK-PLATES, the English name for a label bearing a name, crest, monogram, or other design, placed in a book to indicate its ownership, place in a library, etc. The use of book-plates is of some antiquity, and mention has been made of one dated in the middle of the 15th century, but at present the fine book-plates of Bilibaldus Pirckheimer (1470-30), designed by Albert Dürer, hold the foremost place in point of time. The earliest English engraved book-plate known is that of Sir Nicholas Bacon, father of Lord Chancellor Bacon, which is dated 1574. Many distinguished artists have condescended to produce book-plates. The name of Albert Dürer has already been mentioned as the designer of Pirckheimer's two plates; and Hogarth engraved a book-plate for John Holland, heraldic artist, and another for George Lambert, the scene painter. Of English engravers, William Marshall and Robert White may be especially mentioned.

BOOK-SCORPION (*Chelifer cancroides*), a small arachnid, in appearance between scorpion and mite. The front of the body is scorpion-like, and



bears a transverse dorsal groove; the posterior body is flat, with ten or eleven rings; there are two eyes; the respiration is by means of air-tubes. Spinning-glands are present, and the body is sometimes covered by the secretion. The size is about one-eighth of an inch, the color brownish. The book-scorpion lurks among old books and papers, and probably helps their preservation by killing book-lice, mites, and other small insects.

**BOOKWORM**, any grub which feeds on the paper of books. The name more especially belongs to the larva of two species of small beetles, *Anobium panicum* and *Plinus brunneus*, belonging to the family *Ptinidae*. In America, books in libraries are free from the ravages of the bookworm; the creatures are extremely rare in Britain, especially since so many chemical substances have been introduced into the manufacture of paper, but in Southern Europe the book-eating anobium is still common enough.

**BOOM**, in a ship, is a general name for the long spars which jut out from certain supports or uprights, to stretch or extend the bottom edge of sails. According to their connections, they receive the names of jib-boom, flying jib-boom, main-boom, square-sail boom, etc. The term boom is also applied to a strong barrier, as an iron chain or cable, beams, or a combination of spars, etc., lashed together with chains, and employed in barring the navigable passage of the mouth of a river or harbor. The wooden boom across the harbor was an important feature in the famous defense of Londonderry in 1689. In the United States a chain of floating logs fastened together and stretched across a creek or river to stop floating timber is termed a boom.

**BOOM**, a word frequently used for a start or rapid development of commercial activity or speculation, as when shares go off, or prices go up "with a boom." It is a recent American use, originating in the West, and first made familiar in 1878. The word is assumed to be suggested less by *boom* in the sense of noise, rather than by the sudden activity, the rush, which the noise often accompanies.

**BOONE, DANIEL**, born in Bucks county, Pa., Feb. 11, 1735, died in Missouri, Sept. 26, 1820. He was a pioneer of Kentucky and a famous hunter. After his marriage to Rebecca Bryan he set out (1769) with a party of six men to explore the wilds of Kentucky. They met with various adventures and succeeded in building a fort on the Kentucky River, which he called Boonesborough. Returning to his old home he organized a company of thirty persons, including his wife and daughters, and safely conducted them to his fort. Boone had many encounters with the Indians, and once was captured and adopted into the family of a chief, but he made his escape. Boone had considerable trouble in getting the government to acknowledge his title to land. He was obliged to give up his claim at Boonesborough, and eventually settle in Missouri. His grave is near Frankfort, Ky., a few miles from the site of Fort Boonesborough.

**BOONE**, a city of Iowa, about forty miles north of Des Moines, an important shipping station for coal, immense quantities of which are mined in the vicinity. It contains also extensive manufactories of flower, iron, carriages, woolen goods, and gloves.

**BOONESBOROUGH**, a village of Kentucky, situated on the Kentucky River, about twenty miles southeast of Lexington. Daniel Boone here erected and successfully defended, in 1775, the first fort built in Kentucky.

**BOONESBOROUGH**, a village of Iowa, county-seat of Boone county, situated near the Des Moines River, about two miles west of Boone. It contains

manufactories of agricultural implements and of carriages, and in the vicinity are extensive mines of bituminous coal.

**BOONEVILLE**, a city of Missouri, county-seat of Cooper county, and a river port, situated on the right bank of the Missouri River, about 200 miles west of St. Louis. It stands on a bluff about 100 feet above the river. Coal, iron, lead, marble and lime are found in the vicinity. The city contains important manufactories of iron, earthenware, wine and textile fabrics, and is the seat of the Cooper Institute for ladies. It was the scene of a battle fought June 17, 1861, in which a Confederate force under Colonel Marmaduke was routed by the Union troops under General Lyon.

**BOONTON**, an important manufacturing town of New Jersey, situated on the Rockaway River, about fifteen miles west of Paterson. Its iron-works are among the most extensive in America. Besides blast-furnaces, rolling-mills, plate-mills, nail-mills and nut-mills, there are manufactories of hats and of flour, and a thriving trade in general merchandise.

**BOONVILLE**, a village of New York, about 25 miles north of Rome. It contains manufactories of lumber, leather, cheese, churns, gloves and chairs.

**BOORDE, ANDREW** (1490-1549), born about 1490, near Cuckfield, in Sussex, England, and brought up under the stern discipline of the Carthusian order. About 1528 he succeeded in getting a dispensation from his vow, and subsequently studied medicine at Orleans, Toulouse and Wittenberg. On his return to England he was patronized by Cromwell, and afterward traveled in his service on a confidential mission through parts of France and Spain. The year 1536 was spent in the study and practice of medicine at Glasgow. He returned to London, and thereafter crossed the seas and traveled by Antwerp, Cologne, Venice and Rhodes to Jerusalem. After his return he lived in London and Winchester, where his flagrant immoralities brought him into serious trouble. In the spring of 1549 he was committed to the Fleet prison in London, and soon after died. Boorde's chief works are his *Dietary* and the *Fyrst Boke of the Introduction of Knowledge*, edited by Dr. Furnival for the Early English Text Society in 1870. His *Itinerary of Europe* has perished, but the *Hand-book of Europe* survives, and the *Itinerary of England or Peregrination of Doctor Boorde* was printed by Hearne in 1735. The earliest known specimen of the Gypsy language occurs in the *Introduction*. It has been asserted by some that Boorde, who was a fantastic reprobate, was the original "Merryandrew." See *Britannica*, Vol. IX, p. 366.

**BOORHANPOOR**, or **BURHANPOOR**, the ancient capital of Candeish, Hindostan. The streets and houses are well built. The Great Indian Peninsular Railroad has a station here. A mosque built by Arungzebe is one of the remarkable buildings. Flowered silks, brocades and muslin, as well as gold and silver thread, are manufactured.

**BOOS, MARTIN** (1762-1825), a Catholic priest, born at Huttenried, in Bavaria, Dec. 25, 1762. He was from about 1790 the originator of a religious movement closely akin to those of the Protestant Pietists. From 1806, when he settled at Gallneukirchen, his influence spread widely among the Catholic laity, and extended to about sixty of their priests. Himself a staunch Catholic, he was often bitterly persecuted, till, in 1817, the Prussian government appointed him a professor of theology and teacher of religion at Düsseldorf. In 1819 he removed to Sayn near Newwid, and died there Aug. 29, 1825.

**BOOT, JOHN FLETCHER**, a Cherokee warrior and member of the executive council of the Cherokee Nation, who was converted to Christianity in 1825, and became an eloquent and powerful Methodist preacher. He preached to his people in their native language, and was the first of that nation to administer the sacrament of the Lord's Supper. He died in 1853, being about sixty years old.

**BOOTES**, in Greek mythology, the son of Demeter and Iasion, who, being plundered of all his possessions by his brother, invented the plow, and cultivated the soil. He was translated to heaven under the name of Boötēs ("ox-driver"), which is still borne by a constellation beside the Great Bear. It is supposed to represent a man holding a crook and driving the bear. The bright star *Arcturus* is in Boötēs.

**BOOTH**, a covered stall or hut at a market or fair, from which goods are sold, still much used in the east of Europe and in Asia, and in England at Weyhill Fair (see *Britannica*, Vol. VIII, p. 848), near Andover. As towns sprang up, the yearly fair was more or less supplanted by the weekly market, and the slight booth had a tendency to become permanent.

The records of the 12th and some following centuries are full of complaints against the encroachments which were in this way made upon the market-places and streets. Stow relates that the houses in Old Fish Street in London, "were at the first but movable boards set out on market days to show their fish there to be sold; but, procuring license to set up sheds, they grew to shops, and by little and little to tall houses." So in Edinburgh the range called at first "The Boothrow," and afterwards "the Lucken-booths," arose in the very center of High Street. Traces of the Middle Age booth still remain in England, and in France there are many perfect examples, some believed to be of the 12th century.

**BOOTH, EDWIN THOMAS**, named for Edwin Forrest and Thomas Flynn, born in Bel Air, Md., Nov. 3, 1833. His education was desultory, and at an early age his father, Junius Brutus Booth, took him on his professional trips as dresser and attendant. During one of these Edwin made his first regular appearance on the stage. This was at Boston in 1849. His father did not approve of the son's choice of profession, but did not oppose him. In 1851 his father was ill in New York city, and the son took his part as Richard III. The elder Booth one night observed his son dressed for the part of Jaffier in *Venice Preserved*, and said, "You look like Hamlet; why don't you play it?"

Edwin Booth left his father and traveled about, going to Australia and the Sandwich Islands, and experienced many privations. Returning through California to the Eastern States he played as a star in many cities. He had now acquired experience and considerable fame, which latter was greatly increased in the years that followed. He performed the then great feat of playing Hamlet for one hundred consecutive nights (Nov. 21, 1864, to March 24, 1865). He became manager of the Winter Garden Theater, New York (1862-67), and brought out magnificent productions of Shakespeare's greatest works.

In 1869 Booth's Theater was dedicated; it was run by him for thirteen years, but did not prove a financial success, and after it was torn down he was obliged to earn another fortune to pay off the debts it left on his hands. Lawrence Barrett, Edwin L. Davenport, J. W. Wallack, Jr., Joseph Jefferson, Charlotte Cushman and Modjeska were among the stars that appeared in Booth's theater.

Edwin Booth has made trips to Germany and England, and within the last few years has made starring tours in company with Lawrence Barrett through the principal cities of the United States. He was married July 7, 1860, to Miss Mary Devlin, of Troy, who died in Dorchester, Mass., Feb. 21, 1863, leaving a daughter, Edwina, a year old. In 1869 Booth was again married, the lady being Miss Mary Rannion McVicker. She died in 1881 and left no children. Booth's favorite and best impersonation is in the character of Hamlet.

**BOOTH, JOHN WILKES**, actor, born in 1839, was shot by Sergeant Corbett, April 26, 1865. He was a son of Junius Brutus Booth. His name has been rendered infamous by his assassination of President Lincoln. See *Britannica*, Vol. XIV, p. 661.

**BOOTH, JUNIUS BRUTUS**, born in London, May 1, 1796, died Nov. 3, 1852. He received an excellent education and was undecided what profession to enter. After trying painting, poetry, law and other occupations he entered the dramatic profession, contrary to his father's wishes. After trips in Holland and Belgium he went to London, and within four years had become a great success.

In 1821 Booth arrived in America, where his dramatic career was most brilliant. At one time he seriously contemplated leaving the stage and becoming a light-house keeper. He purchased a sylvan retreat twenty-five miles from Baltimore, where he occasionally retired for recreation. On this little farm he found pleasure in rural pursuits, and it was to this place that he brought his old father, who had always been a great admirer of America. Mr. Booth acted in New York, Baltimore, New Orleans (here he gave French plays with great success), Richmond, Philadelphia and San Francisco. His son Edwin traveled with him through the West, playing companion characters.

Booth died on a trip up the Mississippi River from New Orleans. His life was made unhappy by the death of three children, by attacks of insanity, to which he was subject, and by his own habits of intemperance. He appeared with such actors as Kean, Forrest and Hamblin in many of Shakespeare's plays, and also the dramas entitled *The Iron Chest*, *Bride of Abydos*, *The Apostate*, *Andromaque*, *The Rivals* and *Riches*. His best impersonation was the character of Richard III.

**BOOTH, MARY LOUISE**, born at Millville (Yaphank), N. Y., April 19, 1831, died in New York city, March 5, 1889. She was of French descent, and as a child displayed talent. She taught school with her father in Williamsburg, L. I., but gave it up on account of ill-health, and adopted literary work, sending sketches to the newspapers and translating French stories. During the late war she engaged in translating works of famous Frenchmen who were in favor of the Union cause. De Gasparin, Laboulaye and Cochin were among the authors whose works she translated and with whom she corresponded. Her patriotic work received the praise of President Lincoln and other statesmen. She translated the *History of France*, by Henri Martin. She was author of the *History of the City of New York*, which was brought down to the date 1880. In 1867 "Harper's Bazar" was established, and Miss Booth was its editor until her death.

**BOOTH, REV. WILLIAM**, founder and "general" of the Salvation Army, born at Nottingham, England, in 1829. He was educated there, and from 1850 to 1861 acted as a minister of the Methodist New Connection. From the first he was a zealous evangelist, but the new departure which led to the creation of the Salvation Army on military lines began in 1865, with mission work among the lower classes in the East End of London.



Since 1873 Booth's organization has been known as the Salvation Army, of which he has continued to be the main spring and controlling power, directing its movements at home and abroad from his headquarters in London. His enthusiasm and wonderful organizing power have given life to the religious military system, of which he is truly "general." Booth has written several hymns and religious works dealing with the movement.

BOOTHBAY, a village of Maine, situated on the Atlantic Ocean at the mouth of the Damariscotta River. Its harbor is an excellent one, and is open during the winter. The chief industry is fishing. The town is a prosperous trade-center and a popular summer resort.

BOOTLE-CUM-LINACRE, a northern suburb of Liverpool, including a large portion of the Liverpool docks, but since 1868 forming a separate municipal borough. Population, 27,112.

BOOTON, an island of the Malay Archipelago, separated by a narrow strait from the southeastern bay of Celebes, and from the island of Muna. It is high, but not mountainous, and thickly wooded; produces fine timber, rice, maize, sage, etc. The people are Malays. The Sultan, who resides at Bolio, is in allegiance to the Dutch, an under-resident being stationed on the island. Area, 1,700 miles; population, 17,000.

BOOTY, the victor's share in property captured from the vanquished; plunder; pillage. It is generally a military term, the word prize being more frequently used in the navy.

BOPPARD, a town of Rhenish Prussia, on the left bank of the Rhine, 10 miles south of Coblenz. The *Bandobriga* of the Romans, it was afterwards an imperial city till 1312, and the seat of a diet in 1234. Population, 5,594.

BORA, KATHARINA VON, the wife of Luther, born of an old family in the district of Meissen, Jan. 29, 1499, died at Torgau, Dec. 20, 1552. At a very early age she entered a Cistercian convent of Nimptschen, near Grimma. Becoming acquainted with Luther's doctrines, she found herself very unhappy in her monastic life; and, finally, with eight other nuns, whose relatives, like her own, refused to listen to them, she applied for assistance to Luther. Luther obtained the services of Leonhard Koppe, a citizen of Torgau, and by him and a few associates the nine nuns were liberated from the convent in April, 1523. They were brought to Wittenberg, and Katharina became an inmate in the house of the burgomaster Reichenbach. Luther, through a friend, Amsdorf, offered her the hand of Dr. Kaspar Glaz. She declined this proposal, but declared herself ready to marry Amsdorf, or Luther himself. Her marriage with Luther took place June 13, 1525. See LUTHER, *Britannica* Vol. XV, p. 79. She bore her husband three sons and three daughters, and is best described in Luther's own words as "a pious, faithful wife, on whom a husband's heart could rely."

BORAGE (*Borago*), a genus of plants of the natural order *Boraginaceae*, of which genus there are few species. A European plant, *Borago officinalis*, the principal representative of the genus, is an herb of somewhat stout and coarse appearance, but with beautiful blue flowers. Borage was formerly much cultivated and highly esteemed, being classed among the *cordial* flowers, and supposed to possess exhilarating qualities for which it no longer receives credit. It was frequently put in wine, and, although it has no sensible properties, its traditional virtues still retain for its leaves a place in the preparation of claret-cup. The young leaves and tender tops are pickled, and occasionally boiled for the table, and are still used in salads in Germany.

BORAGINEÆ, or BORAGINACEÆ, a large chiefly herbaceous order of cordifloral dicotyledons, the alternate exstipulate leaves generally rough with hairs which proceed from a thick, hard base, the flowers regular, and the fruit consisting of four distinct nutlets or of a drupe containing four nutlets. The order includes the forget-me-not, the heliotrope, borage, alkanet, comfrey, etc.

BORAX LAKE, a small body of water situated in Lake county, California, and separated from Clear Lake, on the west, by a dike of obsidian. It is remarkable as the source of supply of immense quantities of borax, which is found in the form of crystals in the mud at the bottom of the lake. The water is a strong solution of borax, and in the vicinity of the lake are numerous mineral springs.

BORDEN, GAIL, inventor, born at Norwich, N. Y., Nov. 6, 1801, died at Borden, Texas, Jan. 24, 1874. While on a surveying expedition his attention was called to the need of suitable foods for emigrants, and he began a series of experiments. He produced "pemican," a kind of meat biscuit which was carried by Dr. Kane in his Arctic expeditions. In 1856 he secured a patent for his method of condensing milk, and afterward produced beef extract, condensed tea, coffee, and cocoa, as well as condensed fruit juices. His patents brought him much wealth.

BORDENTOWN, a city of New Jersey, situated on the Delaware River, about six miles below Trenton. It was founded in 1717, and is noted as having been the residence of Francis Hopkinson, Joseph Hopkinson, Admiral Charles Stewart, Joseph Bonaparte, and Prince Murat. The Bonaparte mansion is still standing. Bordentown is the seat of Bordentown Female College and of a military institute, and contains a number of important manufactories, including iron, machinery, shirts, and ship-building.

BORDERS, THE, as a term denoting the tract of country lying immediately on both sides of the frontier line between England and Scotland, it is somewhat elastic in its signification. *Geographically*, the frontier line runs diagonally northeast or southwest, between the head of the Solway Firth at the latter extremity, and a point a little north of the mouth of the Tweed at the other extremity; the counties touching upon this line being Cumberland and Northumberland on the English side, and Dumfries, Roxburgh, and Berwick on the Scottish side. The distance between the two extremities is nearly 70 miles as the crow flies, but following the frontier line in its irregularities about 110 miles.

While the above may be taken as defining the Border in a geographical sense, the word has for *historical* purposes a wider signification, especially on the Scottish side. The territory thus indicated on the Scottish Border includes the whole of the counties of Berwick, Roxburgh, Selkirk, and Peebles, a considerable portion of Dumfriesshire, and part of Galloway. Although the name of the Border, or Borders, is not perhaps older than the 13th century, it is of interest to note that from the very dawn of British history the district so called has exhibited in its annals the characteristics of a frontier, in that it has almost constantly formed the point of contact between contending races and nations.

The Borders have been the scene of some great historical battles. To narrate all the invasions that took place on either side of the Border would be to repeat great part of the general history of England and Scotland.

There is yet a third and more popular sense in which the word Border is used. This, which may be called the *literary* sense of the term, arises out of the prominence which has been given to the vale of the Tweed, including its tributaries the Yarrow,

the Ettrick, and the Teviot, by the romances and poems of Sir Walter Scott, by the poetry of Leyden and of the Ettrick Shepherd, by the ancient and traditional ballads relating to the district, and by the pathetic songs and legends more immediately connected with the Yarrow, and glorified by the genius of Wordsworth. Hence, when Border tales or Border ballads or Border traditions are spoken of, it is the Scottish rather than the English side of the frontier that is referred to.

**BORDER-WARRANT**, an obsolete form of diligence used in the border counties of Scotland for detaining the person of an English debtor. It was more rigorous than the general *meditatio fugæ* warrant.

**BORDIGHERA**, a winter resort in the Riviera, North Italy, on a hill overlooking the Mediterranean, seven miles southwest of San Remo by rail. It was founded in 1470, but its modern progress dates from the opening of the Cornice road in 1823, and of railway communication. Bordighera suffered in the earthquakes of February, 1887. Population, 2,556.

**BORDONE**, Paris, a painter of the Venetian school, born of noble parentage at Treviso, Italy, in 1500, died at Venice in 1570. He studied under Titian and under Giorgione, and much of his earlier work was done in his native town, in Vicenza, and in Venice. In 1538 he was invited to France by Francis I, who employed him to paint portraits of himself and of leading members of his court. He was knighted by Francis II. He painted at Augsburg in the Fugger Palace, and at Milan in the chapel of St. Jerome. His most important monumental work in painting was the six sacred subjects with which he decorated the dome of San Vicenzo, Treviso; and his *Fisherman Presenting the Ring of St. Mark to the Doge*, now in the Academy, Venice, is ranked as masterpiece among his easel pictures. He is represented in the National Gallery, London, by *Daphnis and Chloe*, and *A Portrait of a Genoese Lady*.

**BORE**, a tidal phenomenon at the estuaries of certain rivers, also called *Eagre*. When a river expands gradually towards a very wide mouth, and is subject to high tides, the spring flood-tide drives an immense volume of water from the sea into the river; the water accumulates in the estuary more rapidly than it can flow up into the river, and thus there is gradually formed a watery ridge stretching across the estuary and rushing up towards the river and over the level sands with great velocity and much noise.

The most celebrated bores are those of the Ganges, Indus, and Brahmaputra. The last is said to rise to a height of 12 feet. In the Hoogly branch of the Ganges, the bore travels 70 miles in four hours, and often appears suddenly as a liquid wall over seven feet high. In the Amazon and other rivers in Brazil the bore reaches a height of from 12 to 16 feet. In England the phenomenon is most noticeable in the Severn, Trent, and the Wye, and in the Solway Frith. The bores in the Bay of Fundy are very remarkable. On the Amazon this phenomenon is called the *prororoca*; on the Seine, the *barre*, and on the Garonne and Dordogne, in France, the *mascaret*.

**BORE**, the internal cavity of any kind of fire arm. It is in most cases cylindrical, but in the Lancaster gun it is oval, and in the Whitworth hexagonal, both being also spiral, while in all rifled firearms it is furrowed with spiral grooves, and for the same reason: to give that rotation which enables an elongated projectile to be used. The diameter of the bore is called the "caliber." In rifled guns the bore is measured, not from the bottom of the grooves, but from the smooth surfaces between them, called the "lands."

Heavy iron guns were formerly cast solid and then bored out, but as it is essential that the surface of the bore should be extremely hard to prevent its being "scored" by the shot, endeavors were made in America to attain this object by casting them hollow, and cooling the inner surface more rapidly than the rest of the metal. Large guns of modern construction are, however, either made entirely of steel, as in the "Krupp" process, or, as in the Woolwich and Armstrong systems, have a steel tube, toughened in oil, for the bore, and strengthened outside by coils of wrought iron shrunk on over it, so that the hardness of the bore is assured.

**BORERS**, a name applicable to many beetle-like or coleopterous insects in the family of wood-eaters or *Xylophaga*, but peculiarly applicable to the genera *Ptinus* and *Anobium*. They are mostly inconspicuous insects, resting during the day in the larval tunnels, active and roving at night. *Ptinus fur* is common all the world over, and is very destructive to herbariums, collections of insects, stuffed birds, etc. The larva of *Anobium striatum* does great damage to furniture made of soft wood. Its little round tunnels, looking as if made by a drill, and full of the finest powder formed from the devoured wood, are familiar enough. The species *Anobium tessellatum* and *Anobium pertinax* are also found in furniture, but more usually on trees. There are many other genera of borers, *Lymexylon navale* on ship-timber, *Ptilinus* on books, and *Apaté* on oak furniture. The Clover-root borer, a small scolytid beetle, *Hylesinus trifolii*, imported from Europe into America, is very injurious to clover. The perfect beetle is a little over two millimeters in length, oval in form, and of a dark-brown color. The Grape-root borer, the larva of *Ægeria polistiformis*, a moth of the *Ægeriidae* family, is a white fleshy grub which eats the bark and sap-wood of the grape-root.

**BORGNE**, commonly called Lake Borgne, a bay of the Gulf of Mexico, about twenty miles wide, extending from Mississippi Sound sixty miles westward to within twelve miles of New Orleans, and communicating by Rigolet's Pass with Lake Pontchartrain on the north. It is a part of the route of steamers running between New Orleans and Mobile. Its shores are a narrow and almost continuous ridge of shells, which separate it from numerous surrounding marshes and cane-brakes.

**BORISSOV**, a town in the Russian government of Minsk, on the Beresina, 418 miles southwest of Moscow by rail. Population, 14,235.

**BORKUM**, one of the East Frisian Islands, at the mouth of the Ems, 25 miles northwest of Emden. Population 684, increased in the summer by over 2,000 visitors.

**BORMIO**, a town of Italy in the province of Sondrio, 27 miles northeast of Tirano. It has a number of hot sulphur baths. Population, 1,744.

**BORN, BERTRAND DE**, a famous troubadour, born about 1140 in Perigord. He played a conspicuous part in the struggles of the English king Henry II, and his sons, during the latter part of the 12th century. He died before 1215. More than 40 of his poems are extant.

**BORNA**, a town of Saxony, on the Wyhra, 17 miles southeast of Leipzig by rail. Population, 7,350.

**BORNEO CAMPHOR**, a variety of camphor produced in Sumatra and Borneo. It is obtained from the tree *Dryobalanops camphora*, and is highly prized by the Chinese, who give for it a much higher price than for ordinary camphor.

**BORNING**, a process of judging of the straightness or level of a surface or line by the eye, which looks along two or more boring or boring rods or pieces set up for the purpose. The term is used by masons, surveyors, and gardeners.



BORNÜ (*Bornoa*, or "Land of Noah"), a Mohammedan state in the Central Sudan. Area, about 56,000 square miles. Population, over 5,000,000. Capital, Kuk, or Kukawa, lying on the west side of Lake Chad. See *Britannica*, Vol. IV, pp. 60, 62.

The Sultan, whose official title is Mai, is an absolute monarch. He is assisted by a council comprising the Kokenawa, or military chiefs, the official delegates of the various subject races, and several members of the reigning family. The standing army of about 80,000 men is partly armed with rifles, and the cavalry still wear armor, either imported from Eastern Sudan or manufactured in the country. There is also some artillery, and a few companies even wear European uniforms. In lieu of pay the men receive allotments of land.

Most of the people, who call themselves Ka-nuri, that is, "People of Light," are of mixed Negro and Dasa (southern Tibu) descent, and speak a Tibu dialect that has been reduced to written form by the Protestant missionaries. The other chief elements of the population are the Tuareg Berbers in the north; the Arabs mainly in the southeast; the Makari and Marghi Negroes in the south; the Wanga, Beddë, and other pagan tribes in the east; and in the center the Magomi, who claim kinship with the royal dynasty which for many centuries ruled over the united Bornu and Kanem states. These and the Kanuri are regarded as the most cultured people in Central Africa, and their woven fabrics, pottery, and metal-ware are highly prized throughout the Sudan.

BORODINO, a village of Russia, 70 miles west of Moscow. It is situated on the Kaluga, an affluent of the Moskwa, and gave name to the great battle fought between the French army under Napoleon and the Russian under Kutusoff, Sept. 7, 1812. The battle of Borodino was one of the most obstinately disputed in history, and the loss on both sides was almost equally great. Out of 257,000 men engaged, between 70,000 and 80,000 were killed or wounded. The Russians retreated on the following day, but in the most perfect order, and therefore claim this battle as a victory. The honor is also claimed by the French, who name the battle from Moskwa.

BORGLYCERIDE, a compound composed of about 25 per cent. of glyceryl borate, or propenyl borate, and 75 per cent. of free boric acid and glycerine in equal proportions. It is extensively used as a preservative of food, and also in antiseptic surgery, combining, as it does, the valuable properties of the above-mentioned substances.

BOROUGH, or, in Scotland, BURGH. See *Britannica*, Vol. IV, pp. 62-64. In Connecticut, New Jersey, Pennsylvania and Minnesota the borough corresponds in general to the town in other States.

BORROW, GEORGE HENRY (1803-81), born at East Dereham, Norfolk, England, July 17, 1803. His father, a captain of militia, moved about with his regiment to Scotland, Ireland, and many parts of England, finally settling at Norwich, where young Borrow attended the grammar school (1815-18), and for the next five years was articled to a firm of solicitors. He already deserved his gypsy title, *Lavengro* ("word-master"), having picked up a knowledge of Irish, French, German and Danish (these two under Taylor of Norwich), Welsh, Latin, Greek, even of Romany, the language of that strange gypsy race of which he was almost an adopted member. On his father's death in 1823 he went to London to seek his fortune, and for a time made a precarious living by writing. Tiring of this he yielded to his love of Nature and love of adventure and spent considerable time in rambling about England gypsy-wise. Subsequently as agent of the Bible Society he visited St. Petersburg (1833),

and Portugal, Spain, Morocco (1835-39). In 1840 he married and settled down on a small estate at Oulton, near Lowestoft, where, after travels in Southeastern Europe (1844), a tour in Wales (1854), and a residence of some years in London, he ended his days, July 30, 1881. The chief of his fourteen published works are: *The Zincali, or Gypsies of Spain* (1840); *The Bible in Spain* (1843); *Lavengro* (1851), its sequel *The Romany Rye* (1857); *Wild Wales* (1862); and *Romano Lavo-Lil, or Word-book of the English-Gypsy Language* (1874). He has been likened to Cervantes, Defoe, and Lesage. In truth all three were in some ways his literary progenitors; none the less he is always original, always George Borrow. His rare mastery of good, strong English, his rarer power of depicting mankind and Nature, are, however, often marred by mannerisms, transparent mystifications, and unreasoning crotchets.

BORROWDALE, a beautiful valley of West Cumberland, England, ascending from the Derwent-water towards the Honister Pass. In this valley is the Bowder Stone, 89 feet in circumference, and 1,971 tons in weight. The famous plumbago mine at Seathwaite in Borrowdale, which long yielded enormous profits, was closed in 1850.

BORROWING DAYS, the last three days of March (old style), supposed in Scotch folklore to have been borrowed by March from April, and to be especially stormy. In Cheshire, the first eleven days of May are called "borrowed days," because in old style they belonged to April.

BORSAD, a town in the northern division of the province of Bombay, 24 miles northeast of the port of Cambay. Population, 12,228.

BORSOD, a Hungarian county 1,370 square miles in area. It produces coal, copper, iron, fruit, hemp, wine and tobacco; is a fertile province and lies on both sides the Sajo River.

BORTHWICK CASTLE, a splendid ruined tower,  $13\frac{1}{2}$  miles southeast of Edinburgh. It is 110 feet high, and measures 74 by 69 feet. It was founded in 1430. In June 1567 Queen Mary and Bothwell spent four days here. Erichon Castle, whose beautiful court-yard is so finely described in *Marmion*, stands  $1\frac{1}{4}$  miles to the east.

BOSIO, FRANÇOIS JOSEPH, BARON, an eminent sculptor, born at Monaco, March 19, 1769, died July 29, 1845. He studied art first at Paris, afterwards in Italy, and first became famous by the figures which, at the request of Napoleon, he executed for the column in the Place Vendôme. Louis XVIII and Charles X also patronized Bosio; the former made him royal sculptor, the latter a baron. At the time of his death he was director of the Academy of Fine Arts in Paris.

BOSNIA and HERZEGOVINA, provinces of Austria-Hungary. Total area, 23,262 square miles. Population (1888), 1,404,000. For early history, see *Britannica*, Vol. IV, p. 68.

By the treaty of Berlin, July 13, 1878, these provinces were transferred from Ottoman control to that of the Austro-Hungarian government. The present governmental administration is conducted by a Bosnian bureau at Vienna in the name of the Emperor-King. The chief authority in the province itself, with its seat in Sarajevo, is the provincial government (*Landesregierung*), in three departments for internal affairs, finance, and justice. For administrative purposes there are 6 districts (*Kreis*) and 48 county (*Bezirk*) authorities. The provincial government is provided with an advising body, composed of the ecclesiastical dignitaries of Sarajevo and 12 representatives of the populace. Similar councils are also provided for the district and county authorities. Bosnia and Herzegovina contain six districts (*Kreise*). The Sanjak of Novi-

Bazar is occupied by an Austrian military force, though administered civilly by Turkey. In 1885 the population (without military) numbered 1,336,091 (705,025 males and 631,066 females); with military, 1,360,000. Greek Oriental Christians, 571,250; Mohammedans, 492,710; Roman Catholics, 265,788; Jews, 5,805; others, 538. The nationality is Servian; only in the southern districts are Arnauts, and here and there gypsies. The most populous towns are the capital, Sarajevo, with (in 1885) 26,286; Mostar, 12,665; and Banjaluka, 11,357. There is one higher gymnasium, two gymnasia, four commercial schools, 943 elementary schools, with one Greek-Oriental and one Roman Catholic seminary for priests, and one training college for teachers. There is an upper court of justice in Sarajevo, the six district (Kreis) courts and the county (Bezirk) authorities as courts of first instance. Agriculture is in a very low state of development, though the soil is very fertile. Maize, wheat, barley, oats, rye, millet and buckwheat, potatoes, flax, hemp, and tobacco are cultivated. Both provinces have a superabundance of fruit, principally plums. Dried plums are the chief article of export. In 1887 over 400,000 boxes (39,368 tons) were exported, valued at 200,000*l*. Cattle-grazing is important. In 1879 there were, it is estimated, 158,034 horses, 3,134 asses and mules, 761,302 head of cattle, 775 buffaloes, 839,988 sheep, 522,123 goats, and 430,354 swine. Forest-land occupies 45 per cent. of the whole area. Minerals are abundant; mining is now carried on for iron and copper, manganese, chromium, antimony. There are salt-pits at Dolnja-Tuzla. There were, in 1890, 342 miles of railway, and 1,743 miles of telegraph lines. Military service is compulsory over 20 years of age. The native troops comprise four infantry battalions (each seven companies), with a total of 2,484 men on peace footing. The Austro-Hungarian troops of occupation have at present a strength of 23,860 men.

**BOSPHORUS**, CIMMERIAN, an ancient name for the Strait of Yenikale, or Kaffa. It connects the Sea of Azov with the Black Sea.

**BOSQUET**, PIERRE FRANÇOIS JOSEPH, French marshal, born Nov. 8, 1810, at Mont-de-Marsan, in Landes, died Feb. 5, 1861. He entered the Algerian army in 1834, and reached the rank of general of brigade in 1848. During the Crimean war he contributed greatly to the victories of Alma and Inkermann, and took a leading part in the capture of the Malakoff, where he was severely wounded. In 1856 he was made field-marshal of France.

**BOSS**, a term applied in America to one who employs or superintends; a head man or manager. It is a modified form of the Dutch *baas*, "master," a term used literally and figuratively like *boss* in American use. In United States politics, a boss is an influential politician who uses the machinery of a party either for private ends or for the benefit of a clique or ring. To "boss" is to play the master.

**BOSSUT**, CHARLES, mathematician, born at Tartaras, near Lyons, France, Aug. 11, 1730, died at Paris, Jan. 14, 1814. He was assisted in his early studies by Clairant and d'Alembert. From 1752 until the Revolution he was professor at Mezieres, and under the Empire in the Polytechnic Schools at Paris. In the compulsory retirement that followed the Revolution he wrote his famous *Essai sur l'Histoire Générale des Mathématiques*.

**BOSTAN** (El), "the garden," a town of Asiatic Turkey, situated in a plain on the Sihun, on the north side of Mount Taurus, 40 miles northwest of Marsh. Population, 8,500.

**BOSTON**, the chief city and capital of Massachusetts. For its history, see Britannica, Vol. IV,

pp. 72-77. Boston now includes the Island of East Boston (Noddle's Island), originally containing 660 acres, the suburbs of South Boston, Charlestown, Dorchester, Roxbury, West Roxbury and Brighton, with their minor villages. Cambridge, Newton, Somerville and Chelsea are suburban cities. Many of the streets of Boston, once so crooked and irregular, have been straightened at public expense, since the great fire of 1872. Horse railways traverse the principal streets, running out several miles into suburban towns. The old South Church, in which Franklin was baptized, Whitefield preached, and the election sermons were delivered for 160 years, still stands on Washington street. It was sold in 1876 to a patriotic association, and fitted up as a museum.

Boston stands high among American cities in the number and extent of her libraries and schools of learning. The Boston Public Library, on Boylston street, including its branches, is the largest library in this country, and is free to all. Some of the other principal libraries are the Boston Athenæum, Massachusetts Historical Society, State, Social, Law, Boston Medical Association, New England Historic Genealogical Society, Congregational, General Theological, besides many smaller ones. Here also are many art and scientific institutions, and as a corporation Boston supports several schools of industrial and mechanical drawing. The Boston Museum of Fine Arts is an immense building, occupying 97,000 square feet. There is also the Boston Art Club, Boston Society of Decorative Art, American Academy of Arts and Sciences, Boston Society of Natural History, and the Warren Museum of Natural History. Music is also extensively cultivated, as indicated by such institutions as the Handel and Haydn Society, the oldest musical organization in America, founded in 1815; the Harvard Musical Association, Apollo Club, Boylston Club, Cecilia Club, Orpheus Musical Society.

The first free schools in America were established in Boston about 250 years ago, and now the system of public schools is very elaborate and complete, embracing every grade from the primary to the high Normal and Latin schools. The Boston Latin School, preparatory for college, was founded in 1635. The building for the New English High and Latin School is said to be the largest in America devoted to educational purposes, and the largest in the world used as a free public school. Boston University (Methodist), founded in 1869, includes three colleges, four professional schools, and a post-graduate department of Universal science. There is also the Boston University School of Medicine, open for both sexes; Boston College (Roman Catholic); Tuft's College (Universalist); Massachusetts Institute of Technology, and Lowell Institute, which provides for annual courses of free lectures upon the most important branches of natural and moral science. Here is also the Perkins Institution and Massachusetts school for the blind, founded in 1829; the first institution in the world where a systematic education of the blind was attempted, and which has been a model for others of the kind. Here also is the Horace Mann School for the Deaf, Boston Asylum and Town School for Indigent Boys, and Massachusetts School for Idiotic and Feeble-minded Youth, the first in America. Hospitals, asylums, homes and dispensaries abound.

Boston Common, in the center of the city, is a handsome natural park of fifty acres, shaded by about a thousand stately elms, with broad walks, a beautiful sheet of water, the original "Frog Pond," and many objects of special historic interest. Adjoining this on the west is the Public Garden, containing 24½ acres, one of the most attractive spots



in the city. The population has increased from 250,526 in 1870, to 362,839 in 1880, and to 446,507 in 1890.

BCSTON UNIVERSITY. See COLLEGES, in these Revisions and Additions.

BOSWELLIA, a genus of balsamic plants, natural order *Burseraceæ*, of which the species are still very imperfectly known, although the product of some of them—olibanum, generally believed to have been the frankincense of antiquity—(see *Britannica*, Vol. IX, p. 708) has long been of considerable commercial importance for the preparation of incense. The most important species appears to be *Boswellia Carterii*, though several other varieties from the hot and dry regions of Eastern Africa and Southern Arabia have been described. *Boswellia thurifera* or *serrata* of Coromandel yields a resin which is used in that country as incense. *Boswellia Frereana* yields the primitive gum elemi, a highly fragrant resin largely used in the East as a masticatory. The Abyssinian *Boswellia papyrifera* (so called from its laminated paper-yielding bast) also yields an olibanum, but it is not collected.

BOSWORTH, or MARKET BOSWORTH, a small English market town in Leicestershire, southwest of Leicester. It was on a moor two miles south of Bosworth that the battle was fought (1485) in which Richard III was slain, and which terminated the Wars of the Roses. On an elevation called Crown Hill, Lord Stanley placed the crown on the head of the Earl of Richmond, Henry VII. Simpson the mathematician was a native of Bosworth, and Dr. Johnson served there as an usher in the grammar school. Population of parish, 3,978.

BOSWORTH, JOSEPH, D. D., an Anglo-Saxon scholar, born in Derbyshire in 1789, died May 27, 1876. He was educated at Repton, Aberdeen, and Trinity College, Cambridge. Presented in 1817 to the vicarage of Little Horwood, Buckinghamshire, he devoted all his spare time to literature, and especially to researches in Anglo-Saxon. The result of his labors appeared in his *Elements of Anglo-Saxon Language* (1838), a new edition of which, by Professor Toller, has been issued from the Clarendon Press since 1882. Bosworth resided as British chaplain in Holland from 1829 to 1840, when he obtained the vicarage of Wicthe, in Lincolnshire, in 1857 becoming rector of Water Shelford, Buckinghamshire, and in 1858 professor of Anglo-Saxon at the University of Oxford.

BÖSZÖRMENY, a town of Hungary, situated 10 miles northwest of Debreczin. Population, 19,035.

BOTALLACH is the name of a famous mine on the west coast of Cornwall, 8 miles north of Land's End. The works are on the edge of the cliff; part of the underground workings (abandoned in 1875), extended 2,448 feet beneath the sea. The mine was worked as a tin mine in 1721, and in 1841 was famous as a very rich copper mine. It has subsequently been wrought for one or both of those metals.

BOTANIC GARDEN, a garden devoted to the culture of plants for the promotion of botanical science. Like the science itself, the botanic garden owes its birth to the needs of pharmacy; thus at the earliest European school of medicine, that of Salerno, there is record in 1309 of the medical garden of Matthæus Sylvaticus; while in 1333 a similar garden was established by the Republic of Venice.

The botanic garden in the modern sense is usually dated from a private one founded at Padua (between 1525 and 1533), from the public one of Pisa, established by Cosmo de Medici in 1544, or from that of Padua, which dates from the following year. The other great Italian cities soon followed this example, and a botanic garden was also founded at the University of Leyden in 1577. At Paris a royal garden was founded in 1597, but it

was not until 1626 that its scientific purposes were defined. In 1635 chairs of botany and pharmacology were founded, and it soon became famous as the *Jardin des Plantes*. The establishment of gardens continued during the 17th century and those of Oxford (1632), Chelsea (1677), and Edinburgh (1680) may be particularly noted.

A further impetus was given by the popularization of botany in the last century by Linnaeus, and by the consequently increased importance of the subject as a branch of academic education; most European universities, including all German ones, have now their botanic gardens, as well as many purely commercial cities. The leading American universities and cities have followed suit, the gardens of Washington, St. Louis and Cambridge being especially well known.

The mode of arrangement of botanic gardens varies infinitely in detail. The Linnaean system has been replaced by the natural, but in their mode of expressing this no two gardens agree; in some the principle of arranging plants according to their geographical distribution is also largely followed, while economic or medical interests have had a variable share.

BOTANY OF NORTH AMERICA. See *Britannica*, Vol. IV, pp. 79-163.

BOTETOURT SPRINGS, a village of Virginia, about eight miles from Salem, the seat of Hollins Institute for Girls, and the site of Johnson's Spring, noted for its mild and pleasant medicinal waters.

BOTHIE, originally a humble cottage or hut of Scotland, but the term has of late years been popularly applied to a barely furnished and uncomfortable habitation for farm servants, and confined to the eastern and northeastern counties. The bothie of modern times is situated either under the same roof as the stable, or at a short distance from the steading, and the furnishings are of an uninviting, sometimes actually repulsive character. The occupants are usually unmarried men, who frequently have their own food to prepare. Some of the larger farmers, however, provide a woman to do the cooking and cleaning.

BOTHRIOCEPHALUS, a flat parasitic worm allied to the tape worm (*Tenia*), in the class *Cestodæ*, of which the broad tape worm, *Bothriocephalus latus* is the type. See TAPEWORMS, *Britannica*, Vol. XXIII, pp. 49-55.

BOTHWELL, a village of Canada, situated on the Thames, about 25 miles southwest of Chatham. It is the center of industry of the petroleum region, and has also extensive manufactories of lumber and a large trade in lumber, cattle, grain, and woolen goods.

BOTOCUDOS, the most barbarous of the Indian tribes of Brazil, inhabiting the east coast range, between the Rio Pardo and the Rio Doce. Their name is derived from the Portuguese *botoco* "bunghead," with reference to their under lip, pierced to hold a disc of wood. They are of middle height, sturdily built, and have small hands and feet; their features are strongly marked with broad cheek-bones and repulsively thick lips and nose, redeemed by white, regular teeth, and sparkling black eyes. They generally go quite naked, have no fixed settlements, and their food includes anything not absolutely poisonous. Their speech is entirely distinct from that of the other Indian nations; they have no religion, properly speaking, but are abjectly afraid of spirits, and pay a certain worship to the moon as creator of the world. Through systematically cruel treatment they have been almost annihilated, and now number not more than 4,000.

BOTOSHANI, a town of Moldavia, on the Shiska, 62 miles northwest of Jassy, at the terminus of a

branch railway; has an active trade in country produce. Population 39,941, 63 per cent. of whom are Jews.

BO-TREE, the *Ficus religiosa*, or pippul-tree of India. It is held sacred by the Buddhists as the tree under which Sakyamuni, the founder of their religion, is said to have become "enlightened," and to have evolved the four noble truths by which mankind may be delivered from the miseries attendant upon birth, life, and death. The particular bo-tree under which this occurred is said to have been produced at the date of his birth. The bo-tree of the sacred but ruined city Anuradhapura, 80 miles north of Kandy, is in all probability the oldest tree in the world. It is said to have been planted B. C. 288, as a branch of the tree under which Sakyamuni sat when he became Buddha. The main stem of this tree was broken off by a storm in October, 1887. The severed portion was solemnly cremated with religious rites.

BOTRYTIS, a large genus of hyphomycete fungi, containing many of the plants commonly called mold and mildew, and usually growing upon dead wood and leaves. The silkworm disease known as muscardine is caused by *Botrytis bassiana*. A large number of species which occur on living plants were formerly included in this genus, but are now referred to *Peronospora*.

BOTTA, PAUL ÉMILE (1805-70), a distinguished archaeologist and traveler, was born at Turin in 1805. After extensive travels in the New World and in Egypt, he became in 1833 French consul in Alexandria, and thence undertaking a journey to Arabia, published the results in his *Relation d'un Voyage dans l'Yemen* (1841). He was soon after appointed consular agent at Mosul, and commenced a series of discoveries which form an epoch in archaeological science. Early in the spring of 1843 Botta began his search in the heaps of ruins near the Tigris for monuments of Assyrian antiquity (see *Britannica*, Vol. IV, p. 165), and the "Journal Asiatique" soon contained accounts of his enterprise, and disquisitions on the cuneiform writing, which afterward appeared as a separate publication under the title *Mémoires de l'Écriture Cuneiforme Assyrienne* (1848). The French government took up the matter warmly, and a commission of learned men was appointed to conduct the publication of the magnificent archaeological work, *Monuments de Ninive* (1847-50). In 1848 he published *Inscriptions découvertes à Khorsabad*. In 1846 Botta was appointed consul-general at Jerusalem, and in 1857 at Tripoli. He returned to France in 1868, and died at Achères, near Poissy, April 18, 1870.

BOTTESINI, GIOVANNI, contrabassist, was born at Crema, in Lombardy, Dec. 24, 1823. A concert tour, begun in 1840, and extending to America, established his fame as the greatest master of the double-bass fiddle. From 1846 he was director of Italian opera in Havana, Paris, Palermo, and Barcelona, and in 1864 began a series of compositions which ultimately included four operas and an oratorio. His best work, however, is his standard *Méthode Complète de Contre-basse*.

BÖTTGER, JOHANN FRIEDRICH, improver of porcelain manufacture, was born in Reuss-Schleiz in 1682 or 1685, died March 13, 1719. He became an enthusiast in the search for the philosopher's stone, and found patrons at the court of Saxony. The king, dissatisfied with his gold-making, sought to avail himself of the skill which Böttger really possessed, and the latter was compelled to enter upon those experiments of which the celebrated Meissen porcelain was the result.

BOTTLE-BRUSH PLANTS, a name applied to species of *Metrosideros*, *Callistemon*, and other

genera of *Myrtaceæ*, which agree in having sessile crowded flowers with reduced floral envelopes, but large conspicuous compound stamens; the whole inflorescence thus suggesting a bottle-brush. Also applied to the field-horsetail, *Equisetum arvense* and the mare's-tail, *Hippuris vulgaris*.

BOTTLE CHART, a marine chart which purports to show the track of sealed bottles thrown from ships into the sea, during long voyages, and washed upon the beach or picked up by other ships. Lieutenant Becher, an English naval officer, constructed in 1843 a chart of bottle voyages in the Atlantic, so as to illustrate the currents. The time which elapses between the launching of the bottle from the ship and the finding of it on shore or at sea has varied from a few days to sixteen years; while the straight-line distance between the two points has varied from a few miles to 5,000 miles. The Bottle Chart has from time to time been re-edited and republished.

BOTTLE-GOURD, *Lagenaria vulgaris*, natural order *Cucurbitaceæ*, a native of India, but now common almost everywhere in warm climates. It is a climbing musky-scented annual, having its flowers in clusters and a large fruit, from one to even six feet in length, which is usually shaped somewhat like a bottle. The fruit has a hard rind, and when the pulp is removed and the rind dried it is used in many countries for holding water, and is called a *calabash*. The bottle gourd is grown in some parts of the United States. Another species, *Lagenaria idololatrica*, is a sacred plant of the Hindoos, much employed in their religious ceremonies.

BOTTLEHEAD (*Hyperoodon*) one of the toothed whales in the same family as the sperm *Physeteridae*, less correctly but more popularly known as *bottlenose*. See *Britannica*, Vol. XXIV, p. 528.

BOTTS, JOHN MINOR, statesman, born in Dumfries, Prince William county, Va., Sept. 16, 1802, died in Culpeper, Va., Jan. 7, 1869. He was early left an orphan, but received a good education, and was admitted to the bar at the age of 18. He was sent to the State legislature and then to Congress (1839). He continued in the latter for most of the time up to 1849. He was an earnest supporter of Henry Clay, and a personal friend of John Tyler up to the time of his becoming president. Learning that he was about to secede from his party, Botts ceased to be friendly with him. He opposed the repeal of the Missouri compromise, and was generally in sympathy with the Southern representatives in Congress. He used his utmost efforts to keep Virginia from seceding, but, on his failure, retired to his farm near Culpeper Court-house, where he remained during the war. One night a party of men came to his house and arrested and carried him to jail, where he was confined for eight weeks; he was suspected of writing a secret history of the war, and the midnight raid was for the purpose of finding it. In their search they were unsuccessful. After the war Mr. Botts published a volume entitled, *The Great Rebellion: Its Secret History, Rise, Progress, and Disastrous Failure*. His farm was overrun by both armies, and he was subject to many inconveniences; yet after the war he was a delegate to the Philadelphia national convention of Southern loyalists, and later on signed his name to the bail-bond of Jefferson Davis.

BOUCHER, FRANÇOIS, (1708-70), a French painter, born at Paris in 1703; studied at Rome, and became a member of the Academy (1734), and painter to Louis XV (1765). He was an artist of much ability, and equally facile in the production of figure or landscape pictures. The number of his pictures and drawings is said to have exceeded 10,000; he also executed engravings. At his death, which



occurred May 30, 1770, he was director of the French Academy.

BOUCHER DE CRÉVECEUR DE PERTHES, JACQUES (1788-1868), anthropologist and writer, was born at Réthel, France, Sept. 10, 1788. Through his father, an active botanist, he came under the notice of Napoleon, and was employed in numerous missions to Italy, Germany, Austria, and Hungary. From the Restoration he lived at Abbeville, where he died Aug. 5, 1868. He was a writer on various subjects, but only his works on the archaeology of man (see *Britannica*, Vol. II, p. 115) are of consequence now. The first, *De la Création* (five volumes, 1839-41), brought him some reputation, but his long investigations on stone weapons and other remains of early human civilization in the Tertiary and older Quaternary diluvial strata made him famous. His most striking discovery was that of a fossil human jawbone in the quarries of Moulin-Quignon, near Abbeville, in 1863.

BOUCICAULT, DION, a British dramatist, born in Dublin, Ireland, Dec. 26, 1822, died in New York city, Sept. 18, 1890. He studied civil engineering, but turned his attention to dramatic writing. In 1853 he lectured in the United States and took part in dramatic representations. He then spent 14 years in England, writing and adapting plays. In 1874 he returned to the United States, where he afterwards resided. He had charge of the New York Metropolitan Theater for a time and other theaters, but was best known as an author of plays. The *Colleen Bawn*, *The Octoroon*, *The Relief of Lucknow*, *The Streets of London*, *Rip Van Winkle*, and *The Parish Clerk* (plays rendered famous by Joseph Jefferson's acting), *How She Loves Him*, *Lost at Sea*, *Janet's Pride*, *Faust* and *Marguerite*, and many others, are notable for their bright dialogue, humor, pathos, and dramatic action.

BOUGAINVILLE (named after Louis Antoine de Bougainville, French navigator. See *Britannica*, Vol. IV, p. 169), a neotropical genus of the order *Nyctaginaceae*, frequently trained over trellises or under the roofs of greenhouses, on account of the beauty of its peculiar inflorescence; the small flowers, which grow in threes, being almost concealed by as many membranous bracts of rosy or purple color.

BOUGH, SAMUEL, R. S. A. (1822-78), landscape painter, born at Carlisle, England, Jan. 8, 1822. He received some assistance from various painters, but never obtained any systematic art instruction. In 1845 he was a scene-painter in Manchester, and later in Glasgow, where Daniel Macnee, afterward P. R. S. A., encouraged him to become a landscape painter. Among the more important of his oil pictures are: *Edinburgh from the Canal* (1862); *Holy Island* (1863); *In the Trossachs* (1865); *The Vale of Leith* (1866); *Kirkcubbin Harbor* (1867); *Borrowdale*; *St. Monance*, and *Royal Volunteer Review* (1860). Bough settled in Edinburgh in 1855, where he died Nov. 19, 1878.

BOUGHTON, GEORGE HENRY, artist, born in Norfolk, England, in 1836. Three years later the family came to the United States, and the boy passed his youth in Albany, N. Y. He early began to sketch with pen and ink and to paint in oils. With money earned from the sale of his pictures he went to London for study. On his return he settled in New York, where he soon became known as a landscape painter. After a time he went to France, where he spent two years in study and then moved to London. Mr. Boughton depicts Puritan life with much felicity and delicacy. Among his pictures are *The Scarlet Letter*, *Return of the Mayflower*, *Puritans Going to Church*, *Rose Standish*, *The Teaty Governor*, *Waning of the Honeymoon* and *Canterbury Pilgrims*.

BOUGIES, slender cylinders, smooth and flexible, used for distending mucous canals, as the gullet, bowels, or urethra, in cases of stricture or diseases of those parts. For the urethra, they are frequently of German silver or pewter, and vary from one-sixteenth to one-fourth of an inch in diameter, though even larger sizes are sometimes used by surgeons. For the other canals, they are usually made of plaited thread, impregnated with a substance called gum elastic, of which the chief constituent is India-rubber. The name is also applied to rods of similar shade made of gelatin, cacao-butter, or some such substance, which melts at the temperature of the body, and charged with medicaments, which it is desired to apply to the mucous membrane of the urethra or the nasal cavities.

BOUGUEREAU, WILLIAM ADOLPHE, French artist, born at La Rochelle, France, Nov. 30, 1825. He received instruction in art while engaged in business at Bordeaux and proceeding to Paris worked under Picot and in the *École des Beaux-Arts*, where in 1850 he gained the *Grand Prix de Rome*, which entitled him to study in Italy. He first attracted attention by *The Body of St. Cecilia Borne to the Catacombs* (1854), which with his *Philomela and Procne* (1861) is now in the Luxembourg. *Maria Consolatrix* (1877) was also a government commission. Among his other works may be named *The Bather and Vow of St. Anne* (1870); *Harvest Time* and *The Mower* (1872); *Nymphs and Satyrs* (1873); *Holy Family* (1875); *Triumph of Venus* (1879); and *Alma Parens* (1883). He has painted occasional portraits, and among his decorative works are subjects in the Hôtel Péreire, Paris, a ceiling in the theater, Bordeaux, and paintings in the churches of St. Clotilde and St. Augustin, Paris.

BOUILLE, FRANÇOIS CLAUDE AMOUR MARQUIS DE, a distinguished French general, born at the castle of Cluzel, in Auvergne in 1739, died in London, Nov. 14, 1800. At the age of 14 he entered the army, and served with distinction in Germany during the Seven Years' War. In 1768 he was appointed governor of the Island of Guadeloupe, and afterwards commander-in-chief of all the French forces in the West Indies. When war broke out in 1778, he took successively from the British Dominica, Tobago, St. Eustache, Saba, St. Martin, St. Christopher's, and Nevis. He was nominated by Louis XVI in 1787-88 as a member of the Assembly of Notables, and in 1790 he was made commander-in-chief of the army of the Meuse, the Saar, and the Moselle. His decision of character prevented the dissolution of the army and the outbreak of civil war. For his share in the attempted escape of Louis XVI he was obliged to flee from France, and in 1791 he entered the service of Gustavus III of Sweden, and afterwards served in the corps of the Prince of Condé. He subsequently went to England, where his advice in West Indian affairs was useful to the government, and where he wrote his *Mémoires sur la Révolution Française*.

BOUILLON, a duchy, originally German, now included in the Belgian province of Luxembourg, consisting of a wooded and hilly district in the Ardennes about 145 sq. miles in extent. This duchy was the possession of the famous crusader, Godfrey of Bouillon, who, in order to raise money for the crusade, pledged it in 1095 to the Bishop of Liège. It was conquered by France in the war of 1672. By the peace of 1814 the greater part of it was included in the grand-duchy of Luxembourg, and the sovereignty passed to the king of the Netherlands. By the revolution of 1830, Bouillon, with Luxembourg, was separated from the Netherlands, and in 1837 united to Belgium. The principal town

Bouillon, situated between the steep hills on the Semoy, near the French frontier. Population, 2,765.

BOUILLY, JEAN NICHOLAS, French dramatist, born at La Coudraye, near Tours, Jan. 24, 1763, died at Paris, April 14, 1842. He was possessed of rare elevation and sincerity of character, and during the period of the Revolution filled with prudence several important public offices. His writings are somewhat marred by prolixity and over-sentimentality. Of his plays the following are most deserving of mention: *The comic opera Pierre le Grand* (1790); *L'Abbé de l'Épée* (1795); *Les Deux Journées* (1800) for cherubim's music; *Fanchon and Nue Folie* (1803); *Madame de Sévigné* (1805).

BOULAC, BOULAK, BOULAUQUE, or BULAK, the port of Cairo, situated on the Nile about one mile northwest from that city, of which it forms a suburb. It contains the custom-house and warehouses of Cairo, a school of engineering, cotton, sugar, and paper factories, the government printing press, and the splendid and famous national museum of Egyptian antiquities. In the latter are stored the results of extensive and systematic excavations, including also many of the historical relics brought to light by the agency of the Egyptian Exploration Fund. Population, 20,000.

BOULANGER, GEORGE ERNEST JEAN MARIE, French general, born at Rennes in 1837. He was educated at St. Cyr, and served in Algeria, Italy, and Cochinchina; he was with Bazaine at Metz, but escaped to Paris, and held a lieutenant-colonelcy under the Government of National Defense. In 1876 he headed the deputation of French officers at the celebration of the centenary of American independence; he became brigadier-general in 1880, through the influence of the Duc d'Aumale; and in 1884-85 commanded the army of occupation in Tunis, till an arbitrary attempt to exalt the military over the civil authority led to his recall. He was wounded in action in Italy and during the Commune. He died in 1891.

Boulanger was minister of war from January, 1886, to May, 1887, and urged forward the expulsion of the Duc d'Aumale and the other princes from France, and, through the introduction of some desirable army reforms and the appearance of a fortunate music-hall song in his praise, he was adopted as the embodiment of the "revenge" policy by the Parisians, who for some months suffered from what was termed the Boulanger fever. In 1887, while commanding an army corps at Clermont-Ferrand, he was, for his remarks on the then war minister, ordered under arrest for 30 days; and in the same year he challenged Jules Ferry for publicly referring to him as a café-concert hero.

In March, 1888, for disobedience to orders he was deprived of his command, and placed on the retired list, and in April he was elected deputy for Dordogne. When he appeared in the Chamber of Deputies (July, 1888) a stormy scene arose, upon his calling for a dissolution of the chamber. M. Floquet began an altercation with M. Boulanger, and the latter replied in such language that M. Floquet challenged him to fight a duel. It was fought, and the general was wounded in the neck. The following year he was the successful candidate for a seat in the Chamber of Deputies. He was tried by the Senate on the charge of having appropriated a large amount of public money for his own purposes while minister of war. Being convicted, he fled to escape arrest to Belgium and then to England. In September, 1889, he was again successful in a general election, but the election was annulled.

BOULAY, DE LA MEURTHE ANTOINE (1761-1840), count, French statesman, born at Chaumouzey, in

the Vosges, in 1761. He favored the Revolution, but held moderate principles, and in the Council of the Five Hundred he became the opponent both of Jacobinism and of the despotism of the Directory. Under the Empire he assisted in the preparation of the *Code Civil*, and afterward labored with zeal in the administration of the national domains. He adhered to the cause of Napoleon, who had created him count in 1813, and was conveyed by the Russians, after the second restoration, into Germany. Returning to France in 1819, he lived in retirement at Paris, where he died Feb. 2, 1840. He published an essay on the *Commonwealth in England* (1799), an *Bourrienne et ses Erreurs* (1830).

BOULDER, an important city of Colorado, county-seat of Boulder county, situated on both sides of Boulder Creek, near the east base of the Rocky Mountains, about 25 miles northwest of Denver. It represents interests of immense wealth in gold and silver mines, in coal mines, and in agriculture and stock-raising. Iron, lime and building-stone are also abundant. The orchards in the vicinity are among the largest and most fruitful in the State. Among the principal manufactories of the city are flouring-mills, iron foundries, and smelting and sampling works. The altitude of Boulder is 5,184 feet; its climate is delightful, and its proximity to the famous Boulder Cañon and to numerous medicinal springs has made it an attractive resort for tourists and invalids. It is the seat of the University of Colorado.

BOULDER-CLAY, a stiff, tenacious clay, which has a very wide geographical distribution. It has been traced over vast regions in British America and the Northern States of the Union, and over-spreads extensive areas of Europe. It varies in thickness from a few feet up to 20 or 30 yards—being generally thickest upon low-lying regions, and thinning away as it is followed up towards the mountains. It is unstratified, and contains stones scattered confusedly through its mass. The included stones are more or less local in character, as is also the color of the clay. Fossils have been met with at rare intervals in boulder-clay; but these are always derivative, and not unfrequently they are smoothed and striated as are the stones.

The origin of boulder-clay, which was formerly the subject of much discussion, is now hardly in dispute. It is unquestionably the product of glaciation; and from phenomena observed it is believed that this stony clay is simply the bottom-moraine or ground-moraine of extinct glaciers, which formerly had a most extensive development in the northern and temperate latitudes of the globe. Boulder-clay is known in Scotland as *till*—a term which many geologists prefer, inasmuch as boulder-clay is often rather a stony earth than a clay. It was also formerly designated as *diluvium* and *drift*, but these terms are now seldom or never used.

BOULDERS, ERRATIC, large masses of rock found at a distance from the formations to which they belong. The term is generally applied to detached masses found lying on the surface. These boulders or fragments of rocks appear to have been transported from their original sites by ice in the Pleistocene period. Large blocks of Scandinavian rocks are scattered over the plains of Denmark, Prussia, and Northern Germany, and from their magnitude and number frequently form a striking feature in the landscape. They also abound on the shores of the Firth of Forth.

The pedestal of the statue of Peter the Great, in St. Petersburg, was hewn out of a large erratic boulder 1,500 tons in weight, that lay on a marshy plain near that city. The boulder called *Pierre de Marmettes* at Mouthei, in the canton of Valais, con-



tains 70,630 cubic feet, and is large enough to have a chalet built on it. From the nature of the stone it is believed to have been carried by glacier action a distance of 35 miles down the valley. The well-known "Boulder Stone" of Borrowdale is not a true boulder, being simply a detached block, which has fallen from the adjacent crags. The *erratics* of America extend as far south as 40 degrees, but on the old continent do not occur much beyond latitude 50 degrees.

**BOULEVARD**, the name given in France to a broad street or promenade planted with rows of trees. Originally it was applied to the bulwarks portion of a rampart, then to the promenade laid out on a demolished fortification. The boulevards of Paris are the most famous. The line from the Madeleine to the Bastille became a walk in the days of Louis XIV, and then a street. The so-called outer boulevards date from 1786, and were also old fortifications, leveled and planted. The name is now sometimes extended to any street or walk encircling a town, and also to a wide shaded street of park-like appearance, which is not used for heavy teaming.

**BOULOGNE**, a town of France, in the department of Seine, situated on the right bank of the river of that name, about five miles southwest of Paris, from which it is separated by the Bois de Boulogne. The river is here crossed by a fine stone bridge of 12 arches. Population, 30,084. The Bois de Boulogne is traversed by many walks. During the Revolution the trees of the older ones were mostly cut down. But when Napoleon chose St. Cloud, in the immediate neighborhood, for his summer residence, new walks were planted and laid off, and the inclosing walls were restored. All traces of the injuries inflicted during the siege of 1870-71 have now disappeared.

**BOUND**, or **BOUNDARY**, the utmost limits of land by which the same is known and can be described. These are recognized in various ways—for example, by a line of stones, a hedge, a ditch, by reference to possession of tenants, by reference to a plan, and by measurement. The plan is the safest, because least ambiguous, boundary. A boundary fence generally belongs equally to the two neighbors.

**BOUND BROOK**, a village of New Jersey, pleasantly situated on the Raritan River, about 30 miles west of New York. It is an important railroad and manufacturing center, and the headquarters of an extensive trade in lumber.

**BOUNDING CHARTER**, in the Scotch law, a charter which describes the lands by their boundaries. It gives right to everything within the bounds, but it prevents the acquisition by possession of any piece of property outside the bounds, even although the charter contains a clause of parts and pertinents. This rule, however, does not apply to servitudes which can be acquired beyond the limits of a bounding charter, nor to such an incorporeal right as salmon-fishing. When the grant is described both by measurements and boundaries, the boundaries determine its extent, although containing a larger quantity of ground than the measurement.

**BOUNTY**, a term applied to any sum offered by a government to induce men to enlist in the public service, or towards creating or encouraging some branch of industry. It is also applied to sums of money appropriated by different State legislatures for the destruction of wild beasts and destructive birds in sparsely settled sections of country.

**BOURBAKI**, CHARLES DENIS SAUTER, a French general, born at Pau, France, April 22, 1816. He entered the army in 1836, and fought in the Crimea and Italy. In 1870 he commanded the Imperial

Guard at Metz, whence he was sent to England on a secret mission to the empress. Under Gambetta he organized the Army of the North, and commanded the Army of the Loire. From 1873 to 1879 he commanded the 14th Army Corps at Lyons, and in 1881 retired from active service.

**BOURBON**, an educational and manufacturing town of Indiana, pleasantly situated in a fertile agricultural region, about fifty miles west of Fort Wayne. It is the seat of Salem College. It contains important manufactories of flour, boots and shoes, carriages, and furniture. The surrounding country is rich in oak, maple, poplar, beech, walnut, and other valuable timber.

**BOURBONNAISE**, a gently undulating, terrace-formed district in the center of France, northward of the highlands of Auvergne, abounding in grain, fruit, wine, iron, marble, and mineral springs. From 1327 to 1523 it formed the duchy of Bourbon, and afterwards, becoming a dominion of the crown, it formed a separate province of France. It now constitutes the department of Allier and part of the department of Cher.

**BOURBOULE**, a bathing resort in the French department of Puy-de-Dôme, on the Dordogne. It has mineral springs of 88°-129° F., recommended in scrofulous, nervous, and rheumatic affections. Population, 1,127.

**BOURDON DE LOISE**, FRANÇOIS LOUIS, born in the middle of the last century at St. Remy, near Compiègne. He was a fanatical revolutionist, took an active part in the storming of the Tuilleries on Aug. 10, 1792, and under a false name obtained a seat in the Convention. Bourdon contributed to bring about the execution of Louis XVI, and the destruction of the Girondists. In La Vendée, however, he objected to the cruelties of the extreme party, and thus became suspected by the followers of Robespierre, whom he helped to overthrow in 1794. From that time he inclined more and more to the moderate or even royalist party, till in 1797 the Directory had him proscribed and transported to Cayenne, where he died soon afterward.

**BOURGEOISIE**, a French term denoting the middle classes of society as distinguished from the nobility and the working classes proper. It is often applied to the middle classes of any country, more particularly those engaged in trade.

**BOURGET**, LE, a village six miles northeast of Paris by rail, during the siege of the capital in 1870 the scene of a series of bloody struggles disastrous to the French, of which the most important were those of Oct. 30th and Dec. 21st. The Lac-du-Bourget, the largest wholly French lake in the department of Savoie and the basin of the Rhone, lies 780 feet above sea level. It has an area of 16 square miles.

**BOURGET**, PAUL, an eminent French novelist, born at Amiens, France, Sept. 2, 1852. He was educated at the Lyceum of Clermont-Ferrand, where his father was professor of mathematics, and at the College of Sainte Barbe. He began to write in 1873, but it was not until ten years later that he found his true work. During this time he contributed numerous articles to the magazines, and published three volumes of verse. His *Essais* (1883) gave the first indication of marked ability. The second series, *Nouveaux Essais de Psychologie Contemporaine* (1886), was a subtle and searching inquiry into the causes of pessimism in contemporary France. Bourget's first novel, *L'Irréparable* (1884), was followed by *Cruelle Enigme* (1885), *Un Crime d'Amour* (1886), *André Cornelis* (1887), and *Mensonges* (1887). These works have placed Bourget in the front rank of contemporary French novelists.

**BOURMONT, LOUIS DE GHAISNE, COMTE DE** (1773-1846), French marshal, the conqueror of Algiers, born in 1773, at his paternal castle of Bourmont, in Anjou. He went into exile during the Revolution, and from 1793 to 1799 was actively engaged in the anti-revolutionary struggle in Vendée. Subsequently he obtained the favor of Napoleon, and for his brilliant services in the campaigns of 1813-14 was promoted to the rank of general. In March, 1814, he declared for the Bourbons; yet on Napoleon's return from Elba he went over to him, only once more to desert, on the eve of the battle of Ligny, and to betake himself to Louis XVIII at Ghent. His evidence went far to bring about Ney's execution. He was appointed minister of war in 1829, and in 1830 received the command of the expedition against Algiers, the rapid success of which was ascribed to his prudence and energy. For this he received the marshal's baton, but on the July revolution he was superseded, and went to England to share the exile of Charles X. Refusing to take the legal oath, he was struck off the lists of the French army and peerage in 1832. In 1833 Dom Miguel of Portugal placed him at the head of his troops, but the campaign was brief and unsuccessful. Bourmont finally settled on his estate in Anjou, and died there Oct. 27, 1846.

**BOURNE, HUGH**, the founder of the sect of Primitive Methodists, born at Fordhays, parish of Stoke-upon-Trent, Staffordshire, England, April 3, 1772, died at Bemersley, Oct. 11, 1852. At first an assistant to his father, who was a farmer and wheelwright, he afterwards became a preacher among the Wesleyan Methodists. His method of conducting services, and his zeal for open-air meetings, were not approved by the leaders of the denomination, and in 1808 he was cut off from the Wesleyan connection. His preaching was, however, wonderfully acceptable to the public, and he soon gathered round him a large number of devoted adherents. In March, 1810, a committee of ten members was formed at Standley, near Bemersley. This is regarded as the first move toward official organization of the body, which in 1812 adopted the name Primitive Methodists. The first chapel of the body was founded at Tunstall in 1811, by Bourne and his brother. For the greater part of his life he worked as a carpenter and builder, but found time to visit Scotland, Ireland, and the United States. Among his writings was a *History of the Primitive Methodists* (1823). See *Britannica*, Vol. XVI, p. 192.

**BOURONDJIRD**, a town in the province of Irak-Ajemi, Persia, situated in a fertile valley 190 miles northwest of Ispahan. Population, 12,000.

**BOUSSINGAULT, JEAN BAPTISTE**, a French agricultural chemist, born at Paris in 1802. He visited South America, where he served as a colonel under Bolivar. On his return he became professor of chemistry at Lyons, was admitted into the institute in 1839, and in 1857 was made commander of the Legion of Honor. He embodied the results of his investigations in *Economie Rurale* (1844, English translation 1845), which won for him a European reputation. Of his other works the most important is *Agronomie, Chimie Agricole et Physiologie* (7 vols., 1860-84).

**BOUTS-RIMÉS** (French, "rhymed endings"), a kind of verse, the making of which forms a social amusement. The rhymes or endings of a stanza are given out by one of a party, and the lines are filled up by others. It was at one time a very popular amusement, especially in France.

**BOUTWELL, GEORGE SEWALL**, statesman, born in Brookline, Mass., Jan. 28, 1818. After spending his youth on his father's farm he became a merchant in Groton, where he remained till 1855.

He studied law and pursued a course of reading to make up for lack of college training. In 1840 he entered politics. He was sent seven times to the legislature, was thrice defeated as candidate for Congress, and once for governor. In 1851 and 1852 he was elected to the latter office. He was a Democrat, but on the formation of the Republican party he helped in its organization, and has since belonged to that party. He was a delegate to the Chicago convention which nominated Lincoln; he organized the department of internal revenue, and was its first commissioner; he was twice elected to Congress; was chairman of the committee to report articles of impeachment, and was one of the seven managers of Johnson's impeachment. President Grant called him to be secretary of the treasury. In this office he was accused of violating law, but although the house absolved him Mr. Boutwell resigned and took his seat in Congress. He was for six years an overseer of Harvard, and has written on educational topics, taxation, and politics. He has of late years practiced law in Washington, D. C.

**BOUVARDIA** (named in honor of Dr. Boward, director of the *Jardin des Plantes*, Paris), a Mexican genus of *Rubiaceae*, sub-order *Cinchonaceae*. *Bouvardia triphylla* has oblong ternate leaves and beautiful corymbs of scarlet flowers produced from June to November. It is among the favorite ornaments of flower-borders, but requires careful protection from frost.

**BOUVINES**, a village in the French department of Nord, eight miles southeast of Lille, the scene of the victory of Philip Augustus of France over the Emperor Otto IV in 1214—commemorated by a monument (1863)—and a series of struggles in 1794 between the Austrians under Kinsky and the victorious French Army of the North.

**BOVATE**, or **OXGANG**, an old English land-measure, representing as much as one ox, out of a co-operative team of eight, could plough in a season. A bovat was thus the eighth of a *carucate* or work of a plow-team. The area varied according to circumstances from 8 to 18, or sometimes even 24 acres.

**BOVEY COAL**, a form of wood-coal or lignite, which derives its name from being found at Bovey, in Devonshire. It is not now mined, the original excavations being filled with water.

**BOW**, the general name for the stem and forepart of a ship, beginning where the sides trend inward, and terminating where they close or unite in the prow. The word is often used in the plural, the ship being considered to have starboard and port-bows. Starboard is applied to the right-hand side, and port to the left-hand side, looking forward. A narrow bow is called by seamen a *lean* bow, and a broad one is called a *bold* or *bluff* bow. The "V-form," or "U-form" is a nomenclature adopted by the naval architect to denote the character of a section of a bow.

**BOWDITCH, NATHANIEL INGERSOLL**, author, born in Salem, Mass., Jan. 17, 1805, died in Brookline, Mass., April 16, 1861. He was a Harvard graduate, studied law, and became a conveyancer. It was said scarcely a transfer of real estate took place in Boston without his examination of the title; for in this kind of legal business he became very proficient, and his services were in great demand. He derived a large income from his profession, and made a gift of \$72,000 to Harvard College for scholarships and books. He was interested in public institutions of Boston, and published at his own expense a history of its General Hospital.

**BOWDLER, THOMAS** (1754-1825), born of wealthy parents at Ashley, near Bath, July 11, 1754. As



sixteen he went to St. Andrews to study medicine, but graduated M. D. of Edinburgh in 1776, and after some years of travel settled in London, devoting himself mainly to charitable work. He lived for ten years at St. Boniface, Isle of Wight, and for the last fifteen years of his life at Rhydings, near Swansea, where he died Feb. 24, 1825.

In 1818 Bowdler published "*The Family Shakespeare*," in 10 volumes, in which nothing is added to the original text; but those words and expressions are omitted which cannot with propriety be read aloud in a family." The work had a large sale, and was long popular, spite of the ridicule it brought down upon the head of its over-prudish editor, whose name has been immortalized by the addition to the English tongue of the term *Bowdlerism* as a synonym for senseless expurgation.

The last years of Bowdler's life were devoted to preparing a purified edition of Gibbon's History, which was published in six volumes the year after his death, edited by his nephew, under the title: *Gibbon's History of the Decline and Fall of the Roman Empire*, "for the use of families and young persons, reprinted from the original text, with the careful omission of all passages of an irreligious or immoral tendency." In a note the editor says that "it was the peculiar happiness of the writer to have so purged Shakespeare and Gibbon that they could no longer raise a blush on the cheek of modest innocence, nor plant a pang in the heart of the devout Christian."

BOWDOIN, JAMES, an American statesman and author, born in Boston, Aug. 8, 1727, died Nov. 6, 1790. He graduated at Harvard in 1745. In 1778 he was president of the convention by which the constitution of Massachusetts was framed. He was governor of Massachusetts in 1785 and 1786. In the latter year he suppressed the Shays rebellion. Bowdoin College was named in his honor, his son having donated to that institution his valuable library and paintings with gifts of land and money.

BOWDOIN, JAMES, son of the preceding, born Sept. 22, 1752, died on Naushorn Island, Buzzard's Bay, Mass., Oct. 11, 1811. He was of French Huguenot descent. He graduated from Harvard, spent a year in college at Oxford, England, traveled in that country and on the continent, and on his return to the United States engaged in politics and literary pursuits. He was a member of the State Assembly, Senate and Council. The government sent him as minister to Spain in 1804, and commissioned him to treat with that foreign country with regard to "wrongful captures and other injuries" inflicted by the Spaniards. On the establishment of Bowdoin College he gave it 6,000 acres of land, £1,100, and at his death his will bequeathed a large library, paintings, and collections of minerals and philosophical apparatus to that institution, which had been named in honor of his father.

BOWDOIN COLLEGE, a Congregational institution founded in 1794 at Brunswick, Maine. See COLLEGES, in these Revisions and Additions.

BOWEN, FRANCIS, author, born in Charlestown, Mass., Sept. 8, 1811, was a Harvard graduate, and after finishing his course gave instruction there in intellectual philosophy and political economy. He went to Europe in 1839, and made the acquaintance of Sismondi and other scholars. On his return to Cambridge in 1841 he devoted himself to literary labors, and two years later he started the "North American Review." He edited this periodical for 11 years, much of the time contributing the larger part of the articles. In 1850 he lectured before the Lowell institute on Political Economy, and two years later on the Origin and Development of the

English and American Constitutions. In 1853 he was appointed to the Alford professorship of Natural Religion, Moral Philosophy and Civil Polity in Harvard College. Prof. Bowen opposed Adam Smith's views on free trade, Ricardo on rent and Malthus on population. He has lectured much on the English philosophers and written several books, among which are *Principles of Political Economy Applied to the Condition, Resources and Institutions of the American People*, and *Gleanings from a Literary Life*. He died in 1890.

BOWER, BOWMAKER, WALTER (1385-1449), completed the history of Scotland which is known as the *Scotichronicon*, and which was begun by Fordun. See *Britannica*, Vol. XXI, p. 540; Vol. IX, 397. Of Bower's personal history little is known except his own statement that he was born in 1385, and that in the manuscript of the *Scotichronicon*—which manuscript is known as *The Black Book of Paisley*—he is spoken of as "the venerable father in Christ, Walter Bower, Abbott of the Monastery of St. Columba." This monastery was situated on the Island of Inchcolm in the Firth of Forth. He died in 1449. Bower has been somewhat overlooked as one of the authors of the *Scotichronicon*, which is frequently quoted as though written entirely by Fordun, whereas his share of the work, with the exception of certain further materials which he had collected, ends at the close of book V, with the death of David I (1153). Bower continued the history to the death of James I (1437); and, as he was was contemporary with the later events which he describes, he is for this period certainly entitled to be regarded as an independent historian. Like Fordun, he wrote in Latin. The only edition of this history is that printed by Walter Goodall, Edinburgh, in 1759, and no complete translation of it has yet appeared.

BOWERBANKIA, a common genus in the class of *Bryozoa* or *Polyzoa*. These are colonies of minute but highly-organized animals, formerly included among the hydroids or zoophytes, but now unanimously placed at a much higher level. *B. imbricata* is one of the British coral forms. It grows on seaweeds, corallines, stones, etc., between high and low-water mark, or in shallow water, and forms branching tufts sometimes  $1\frac{1}{2}$  inches in height. The branches are small and transparent, and bear numerous individual animals of microscopic size. The genus is named after James Scot Bowerbank, who wrote a famous monograph on the British *Spongiadae* (1864). See *Britannica*, Vol. XIX, p. 430.

BOWER-BIRD, a name given to certain Australian birds remarkable for their habit of making bower-like erections, called "runs" by the colonists of New South Wales, and for adorning them with gay feathers, rags, bones, shells, and such other white or bright-colored objects as they can pick up. These bowers are not used as nests, but they appear to be places of resort. Fine specimens of them, transported with no little difficulty, were deposited in the British Museum by Mr. Gould, in whose magnificent work on the *Birds of Australia* (1848) a full account of them was first given to the world.

The bowers of the satin bower-bird (*Ptilonorhynchus holosericeus*) are built among the low branches of some tree, and appear to be repaired and frequented from year to year. The base consists of an extensive and rather convex platform of sticks firmly interwoven, on the center of which the bower itself is built of more flexible twigs. It is chiefly at or near the entrance that the shells, feathers, etc., employed for decoration are placed.

The satin bower-bird is particularly abundant in the mountainous districts of the west of New South

Wales, and is found in all the "brushes" from the mountains to the coast. The adult male has the whole plumage of a deep, shining black. The colors of the female are grayish, green and brown, curiously mingled.

The bowers of the spotted bower-bird (*Chlamydera maculata*, Britannica, Vol. III, p. 740), are longer and more avenue-like than those of the satin bower-bird; they are placed upon the ground, are outwardly built of twigs, and beautifully lined with tall grasses so disposed that their heads nearly meet. The decorative propensity appears in the highest degree in this species. The spotted bower-bird is restricted exclusively to the interior of Australia. It is rather smaller than the satin bower-bird, has a general color of rich brown beautifully marked with black and buff; a band of elongated feathers of light rose-pink crosses the back of the neck, and forms a broad, fan-like, occipital crest. The regent-bird (*Sericulus melinus*) is also known to form bowers.

**BOWIE-KNIFE**, a heavy sheath-knife, used both as a hunting dagger and weapon. It was named after its inventor, Colonel James Bowie, who fell at Fort Alamo in the Texan war (1836), and was first used in Kentucky and other parts of the United States. The blade is from 10 to 15 inches in length, double-edged near the point. The best knives formerly used on the frontier were made of old horse-rasps and the like, and consequently varied much in pattern and size. The term is now frequently applied to any large sheath-knife without regard to shape.

**BOWLES, SAMUEL**, journalist, born in Springfield, Mass., Feb. 9, 1826, died there, Jan. 16, 1878. After receiving a public school education he began work at the age of 17 in the office of the "Springfield Republican," a paper owned and published by his father. The boy was very active, and soon learned to do all kinds of newspaper work. It was through his persuasions that the paper became in 1844 a daily. From this time the paper flourished. Dr. J. G. Holland was editor, the elder Bowles devoted his attention to the financial department, and the son threw all his energies into the management of the paper. In 1851, by the death of his father, young Bowles, then only 25 years of age, was obliged to assume entire control. During the civil war the "Springfield Republican" acquired a national reputation and great political influence. In 1872 it supported the nomination of Greeley for the presidency, and since then has been independent in politics.

**BOWLING GREEN**, a beautiful city of Kentucky, county-seat of Warren county, situated on Barren River, at its head of navigation, about 70 miles north of Nashville. It is the trade-center of Southern Kentucky, and an important shipping point for pork, tobacco, hay and grain. Its industries include manufactories of iron, woollens and cereal products. It is the seat of a college and a Catholic academy, and contains excellent public schools.

**BOWMAN, SIR WILLIAM**, oculist, born in Nantwich, July 20, 1816. He studied chiefly in London, where he commenced practice as a surgeon, and became curator of the Anatomical Museum. In conjunction with Todd he published the valuable *Physiological Anatomy and Physiology of Man* (5 volumes, 1845-56), and gained a high reputation as an oculist by his *Lectures on Operations on the Eye* (1849), followed by his *Observations on the Artificial Pupil*. He was professor of Physiology at King's College (1845-55); has received honorary degrees from Dublin, Cambridge and Edinburgh; is a fellow of the Royal Society, became consult-

ing surgeon and vice-president of King's College, London (1877) and a baronet (1884).

**BOWMANVILLE**, a thriving town of Ontario, pleasantly situated near the shore of Lake Ontario, about 40 miles northeast of Toronto. It is a port of entry, has an excellent harbor, and contains manufactories of machinery, castings, leather, boots and shoes, woolen goods, carriages, cabinet-ware, lumber and leather.

**BOWSPRIT**, a strong boom or spar projecting over the stern of a ship or other vessel. Its use is to support the jib-boom, a longer and lighter spar, forming a continuation of the bowsprit, which receives the lower ends of the foremast stay-ropes, on which sails are carried.

**BOWSTRING**, the string by which a bow is drawn and the arrow discharged. The term is specifically used for an old Turkish mode of execution, the offender being strangled by means of a bowstring or similar cord.

**BOWSTRING HEMP**, or **MOORVA**: the fiber of a species of *Sansevieria* (especially *Sansevieria Zeylanica*), a plant of the natural order *Liliaceæ*, tribe *Hemerocallæ*, used in the East Indies for making bowstrings. The fiber is hair-like, silky and elastic, and in strength is apparently about equal to hemp. A very similar species (*Sansevieria guineensis*) is found in abundance on the west coast of Africa, and its fiber has been imported as African bowstring hemp.

**BOWYER, SIR GEORGE**, born at Dudley, England, near Oxford, in 1811, died in London, June 7, 1883. He was called to the bar in 1839, represented Dundalk in Parliament in 1852-68, and the county of Wexford 1874-80, when his home rule principles estranged him from the Liberal party, and in 1876 led to his expulsion from the Reform Club. He succeeded his father as seventh baronet in 1860. He was author of several able works on constitutional law and Roman Catholic subjects.

**BOWYER, WILLIAM**, an eminent English printer and classical scholar, born in London, Dec. 19, 1699, died Nov. 18, 1777. He was educated at Cambridge, and in 1722 joined his father in trade. Appointed in 1729 printer of the votes of the House of Commons, he subsequently became printer to the Society of Antiquaries and to the Royal Society. In 1767 he was nominated printer of the Rolls of the House of Lords and the Journals of the House of Commons. Bowyer edited several volumes of Swift's works, and the first translation of Rousseau's *Paradoxical Oration* (1751), and was the author of two essays on the *Origin of Printing* (1774); but his chief production was an edition of the New Testament in Greek, with critical and commendatory notes.

**BOX-DAYS**, days appointed by the Court of Sessions in Scotland, during the vacations, on which pleadings or other law papers may be lodged or filed, the object being to expedite the procedure, notwithstanding the vacation. The name is derived from the fact that all printed papers in the Court of Sessions must be placed in boxes, one for each judge, for each legal society, and for the reporters. These boxes were introduced in 1690 to avoid the evil of private solicitation of judges.

**BOX-HAULING**, a mode of turning a ship when the swell of the sea renders tacking impossible, or when the ship is too near the shore to allow room for veering. The operation is effected by hauling the head-sheets to windward, bracing the head-yards aback, and squaring the after-yards, the helm at the same time being put a-lee. *Boxing-off* is a very similar operation.

**BOXING-DAY**, in England, the first week-day after Christmas, and so called from being the day



on which Christmas-boxes, or presents, are given to servants and others.

**BOXTEL**, a town in the Dutch province of North Brabant, 38 miles southeast of Utrecht. An Anglo-Dutch army, under the Duke of York, was here defeated with great loss by the French in 1794. Population, 5,703.

**BOX-THORN** (*Lycium*), a genus of the order *Solanaceæ*, having funnel-shaped or tubular flowers and two-celled berries. Several species are natives of the south of Europe, thorny shrubs, with long slender shoots and simple lanceolate leaves. *Lycium europæum* may be trained to a height of 30 or 40 feet, and is often planted—as are also other species—to cover walls, etc. *Lycium vulgare* has been sparingly naturalized in the United States. *Lycium fuchsoides*, although destitute of spines, is used as a hedge-plant in the Andes of Quito.

**BOYAR**, a title conferring a rank in the state, given to the highest class of Russian officials previous to the reign of Peter the Great. They ranked next to the knjazes or knjases (ruling princes), and were universally looked up to by the mass of the people—so much so that the most powerful rulers considered it prudent to add to public papers "The Boyars have approved it." Their power acted as a wholesome check upon the authority of the princes, in consequence of which the latter became their bitter enemies. Peter the Great finally abolished the order by giving them a place among the Russian nobility, but at the same time stripping them of their peculiar privileges. The higher nobility of Roumania are also called Boyars.

**BOYAUX** (French, "bowels") are the zigzag approaches used in siege operations to connect the parallels.

**BOY-BISHOP**. The custom of electing a boy-bishop on St. Nicholas's day dates from a very early period. It spread over most Catholic countries, and prevailed in almost every parish of England. The election took place on St. Nicholas's day (Dec. 6), and the authority conferred lasted to Holy Innocents' day (Dec. 28). The boy-bishop, chosen from the children of the church or cathedral choir, or from the pupils at the grammar school, was arrayed in episcopal vestments, and, attended by a crowd of subordinates in priestly dress, went about with songs and dances from house to house, blessing the people. The mock prelate exacted implicit obedience from his fellows, who, with their superior, took possession of the church, and performed all the ceremonies and offices except mass. In 1299 Edward I, on his way to Scotland, permitted a boy-bishop to say vespers before him at Heaton, near Newcastle-on-Tyne. At Salisbury the boy-bishop, it is said, had the power of disposing of such prebends as happened to fall vacant during the days of his episcopacy. The custom was abolished in England by a proclamation of Henry VIII, dated July 22, 1542; it was restored by Queen Mary in 1554, and again abolished during the reign of Elizabeth, though it seems to have lingered here and there in villages till about the close of her reign. On the continent it was the subject of a formal interdict at the Council of Basel (1431); and at Zug, in Switzerland, a similar usage was suppressed so recently as 1797.

**BOYCOTTING**, the system of combining to hold no relations, social or commercial, with a person or company, on account of political or other differences, or of disagreement in business matters, employed as a means of punishment or coercion. It was first formulated by Mr. Parnell, the Irish leader, at Ennis on Sept. 19, 1880, and derived its name from one of the first victims, Captain Boycott, a Mayo factor and farmer. The word, like the

practice, soon became common throughout the English-speaking world, though the term "exclusive dealing" is much preferred by its apologists.

**BOYD**, REV. ANDREW KENNEDY HUTCHISON, D.D., born at Auchinleck, Ayrshire, November, 1825. He was educated at King's College, London, and Glasgow University, where he took the highest honors in philosophy and theology. He first became known in literature by his essays, published in "Fraser's Magazine" under the now familiar initials, A. K. H. B., most of which have been reprinted. He is author of *Recreations of a Country Parson* (three series, 1859-1861), and of many volumes of sermons. His works have been exceedingly popular in America.

**BOYDEN**, SETH, a noted American inventor and manufacturer, born at Foxboro, Mass., in 1788, died in 1870. He began the manufacture of patent leather in 1819 at Newark, N. J., where he invented a machine for splitting leather, and a process for making spelter. Among his other inventions and discoveries were a doming-machine for hats and a process for making Russia sheet-iron. He built one of the first locomotives with outside cylinders, and is thought by many to have made the first daguerreotype in the United States.

**BOYDEN**, URIAH, an American inventor and philanthropist, born at Foxboro, Mass., in 1804, died in 1879. He is known for his improvements in hydraulic engineering, and as the inventor of the modern improved form of the turbine water-wheel. He founded the Boyden Fund for the promotion of education, and spent the latter years of his life in the encouragement and support of chemistry and physics.

**BOYESEN**, HJALMAR HJORTH, author, born in Fredericksvoern, Norway, Sept. 23, 1848. He was educated at the gymnasium in Christiania, and graduated (1868) at the University of Norway, having pursued a course of study at Leipsic, Germany. He came to the United States, where in 1869 he became editor of "Fremad," a Scandinavian paper printed in Chicago. From 1874 to 1880 he taught German in Cornell, and then was called to the same work at Columbia College. During his residence in this country, he has shown a marked aptitude for writing stories and poetry in English. He has been a frequent contributor to the magazines of the day. A partial list of his books is as follows: *Gunnar: a Norse Romance*; *A Norseman's Pilgrimage*; *Tales from Two Hemispheres*; *Goethe and Schiller: their Lives and Works*; *Queen Titania*; *The Story of Norway*; *Ilka on the House-top*. The last mentioned has been dramatized and successfully performed in New York.

**BOYLE**, a town in County Roscommon, Ireland, (see *Britannica*, Vol. XX, p. 850), situated on the river Boyle above its expansion into Lough Key, 108 miles northwest of Dublin by rail. It has a thriving trade in corn, flax, butter, and provisions. An abbey built here in the twelfth century was reduced to its present ruined state in 1595 by the Earl of Tyrone. Population, 2,994.

**BOYLE'S FUMING LIQUOR**, a term applied to a solution of sulphide of ammonium obtained by distilling a mixture of slaked lime, sal-ammoniac, and sulphur. The same substance is produced by passing sulphureted hydrogen into a solution of ammonia. It is a straw-colored liquid, liberating sulphureted hydrogen on addition of an acid or exposure to the air.

**BOZEMAN**, a thriving city of Montana, county-seat of Gallatin, beautifully situated on a small affluent of the Gallatin River, about a hundred miles south of Helena. It is the seat of an acad-

emy and a university school, and contains important manufactories of flour and lumber. Gold and silver are mined in the vicinity, and vast agricultural and grazing interests center here.

**BOZZOLO**, a town of North Italy, fourteen miles southwest of Mantua. Population, 4,154.

**BRABANÇONNE**, the patriotic song of the Belgians, originally sung by the insurgents during the revolution of September, 1830, when they threw off Dutch rule. The words were written by a young French actor named Jenneval, then at Brussels. The verses end with a refrain relating to the substitution of the Tree of Liberty for the Orange, in reference to the house of Orange, then ruling the Netherlands. The music was composed by Campenhout.

**BRACCIO**, **FORTEBRACCI**, Count of Mentone (1368-1424), celebrated Italian free-lance, born at Perugia, of an old patrician family, in 1368. He was engaged in warfare from his early youth, and had already given his sword to various causes, when in 1416 he obtained the sovereignty of his native city. He accepted from Queen Joanna of Naples the command of her land forces, and for his services was created Count of Foggia and Prince of Capua. In 1423; by the queen's command, he was crowned at Perugia, as Prince of Aquila and Capua. His ambition now soared to the throne of Naples itself. He overran Campania and Apulia, and advanced into Calabria, but in a battle before Aquila was wounded and taken prisoner. He died three days later, June 5, 1424.

**BRACE**, in carpentry, an oblique piece of wood used to bind together the principal timbers of a roof or other wooden structure. The name is also used of a curved instrument of iron or wood for holding a bit, used by carpenters for boring.

**BRACE**, on shipboard, a rope attached to the yard-arm, and employed to turn or swing the yard round.

**BRACE**, **CHARLES LORING**, philanthropist, born in Litchfield, Conn., June 29, 1826, died in Switzerland, Aug. 11, 1890. His father, John Pierce Brace, was connected with the Litchfield Academy and subsequently with the Hartford Female Seminary. The son graduated at Yale (1846), and studied theology at that college and also at the Union Theological Seminary. He was not connected as pastor with any church, but frequently preached. He made a pedestrian tour in England in 1850, and his companion, Frank Olmstead, gave a description of the journey in the book *Walks and Talks of an American Farmer in England*. In Hungary he was arrested, imprisoned and tried by a court-martial on suspicion of being in league with Hungarian revolutionists in America. The U. S. minister at Vienna obtained his release. In his further travels in Europe he paid special attention to schools, prisons and the condition of the masses. On his return to the United States (1852), he associated himself with Rev. Mr. Pease in missionary work at the Five Points, and among the prisoners and inmates of hospitals and almshouses. In 1853 he assisted in founding the Children's Aid Society, and a year later opened the first newsboys' lodging house. The benevolent projects originated by Mr. Brace have enlisted public attention and secured hearty cooperation on the part of many; lodging houses for boys have multiplied, and the Children's Aid Society has accomplished great good. Mr. Brace lectured and wrote in behalf of this charitable object, and was sent as delegate to the International Convention for Children's Charities in London (1856), and also to the International Prison Convention in London (1872). Among his published books are: *Hungary in 1851*; *Home Life in*

*Germany*; *Short Sermons for Newsboys*; and *The Dangerous Classes of New York*.

**BRACH**, or **BRACHE**, an old term (origin unknown) for a dog that hunts by the scent; a scenting hound.

**BRACHIAL ARTERY**, the arterial trunk supplying the upper arm; the direct continuation of the axillary artery. It runs down the front and inner side of the upper arm, giving off several branches as it proceeds, and at a point about an inch below the bend of the elbow it terminates by dividing into radial and ulnar arteries.

**BRACHYPTERÆ** (Gr., "short winged"), an ornithological term applied in Cuvier's system of classification to such aquatic birds as penguins, puffins, auks, divers and grebes, whose wings are short and whose feet are placed so far back as to compel them to assume a nearly erect position when on land.

**BRACHYURA**, a technical name applied to short-tailed decapod crustaceans or crabs, in contrast to the *Macrura*, long-tailed forms like the lobsters, where the abdomen is not tucked in on the under surface in the characteristic crab fashion. They are divided into about sixteen families, without super-family grouping. The term is also applied to a family of short-tailed bats, including *Mystacina* and *Noctilio*.

**BRACKEN**, or **BRAKE**, a large genus of ferns of the division *Polypodæ*, distinguished by spore-cases in marginal lines covered by the reflexed margin of the frond. It is very widely distributed, from arctic and temperate to tropical countries. The common brake or bracken (*Pteris aquilina*; see Britannica, Vol. IX, p. 103) is very abundant in rocky thickets, dry fields, etc.

**BRACKENRIDGE**, **HUGH HENRY**, jurist, born near Campbelltown, Scotland, in 1748, died in Carlisle Pa., June 25, 1816. At the age of five he came to America with his father, and they settled in Pennsylvania. He graduated from Princeton (1771), then spent some years teaching there and in Maryland. At about this time he wrote for his pupils a drama, *Bunker Hill* (see Britannica, Vol. I, p. 722), edited the "United States Magazine," studied divinity and served as chaplain in the army. Dropping these varied pursuits he applied himself to law, was admitted to the bar, practiced in Pittsburgh, Pa., and soon obtained such prominence that he was elected to the legislature (1786). During the "Whisky Insurrection" he used his influence to bring about an adjustment of the difficulties. In 1799 he was appointed to the supreme bench of the State, and held the office up to his death. He was author of poems and essays; but his best known work is a story in the form of a political satire which is largely drawn from his own experiences. It is entitled *Modern Chivalry, or the Adventures of Capt. Farrago and Teague O'Regan, his Servant*.

**BRACKET**, an ornamental projection from a wall, used for the purpose of supporting a statue, bust, or the like. Brackets are either of stone, wood, or metal, and are frequently elaborately designed and carved. The term bracket is also employed in joinery to designate a wooden support of triangular outline placed under shelves, galleries, etc., and is also generally applied to such gas-lights as project from the wall. See Britannica, Vol. II, p. 461.

**BRACKETT**, **ANNA**, an American writer and teacher, born in Boston in 1836. She has been prominent in connection with the work of various educational institutions, has published several works on pedagogy, and has contributed numerous able articles to magazines and other periodicals.



BRACKETT, WALTER M., painter, born in Unity, Me., June 14, 1823. Charles Sumner, Oliver Wendell Holmes, and Edward Everett sat to him for their portraits. Of late years he has painted fishing scenes, among which is a series representing salmon-catching with a fly. The artist resides in Boston, Mass.

BRACKLESHAM BEDS, a group of highly fossiliferous strata in the middle Eocene formation, included in the Bagshot series.

BRACQUEMOND, a noted French artist, born in Paris in 1833. See *Britannica*, Vol. XVI, p. 45.

BRADBURY, THEOPHILUS, an American jurist, was born in Massachusetts in 1739. He held many important offices in his State, and was for some years a member of Congress. He became judge of the supreme court of Massachusetts in 1797. He died in 1803.

BRADBURY, WILLIAM BATCHELDER, an eminent musical composer and publisher, and one of the leading manufacturers of pianos in the United States, was born in Maine in 1816. He spent some years in Boston, where he became popular as an organist. About 1840 he began the organization of his well-known singing classes in Brooklyn and New York. The piano manufactory of the Bradbury brothers was established in 1854. He attained considerable popularity as a journalist; but is best known for his excellent music books for Sunday schools. He died in 1868.

BRADBURY, WILLIAM FROTHINGHAM, an American educator, was born in Massachusetts in 1829. He taught school for many years; and became head master, in 1878, of Cambridge High School, of which he wrote the history.

BRADDOCK, a manufacturing town of Pennsylvania, situated on the right bank of the Monongahela, ten miles southeast of Pittsburgh. It contains important manufactories of railroad cars and steel rails, and is noted as the site of the battle of Braddock's Field, in which, in 1755 General Braddock was killed and his British army defeated by the French and Indians.

BRADDOCK, EDWARD, British soldier, born in Perthshire, Scotland, about 1695, died near Pittsburgh, Pa., July 13, 1755. He had served forty years in the British Guards, and attained the rank of major-general, when in 1755 he was ordered to America to assist the colonists in their war with the French and Indians. The plan of his campaign was to march his soldiers from Fredericktown to Fort Duquesne, now Pittsburgh, Pa., thence to Niagara, and on to Frontenac. Benjamin Franklin and Washington (then aid-de-camp to Braddock), warned the general that the Indians would be likely to give him trouble on the way to Fort Duquesne; but Braddock, who was very opinionated, would heed neither advice nor warning, trusting that the discipline of British soldiers was superior to any variety of barbarous warfare. The army set out for the fort and before they reached it were attacked by the savages, who were hidden behind rocks and trees. So sudden was their appearance and so terrifying their war-whoop that the English soldiers, not being able to see their antagonists, fell back with rapidity, would not obey their officers, and the force suffered a terrible defeat. They retired to Great Meadows, where in a few days General Braddock died from a wound received in the engagement.

BRADDON, MARY ELIZABETH (Mrs. John Maxwell), novelist, was born in Soho Square, London, in 1837, the daughter of a solicitor. She very early showed a turn for literature, which she indulged in the usual manner, by sending verses and other trifles to the magazines and newspapers. Neither

a comedietta brought out at the Strand in 1860, a volume of verse, nor one or two novels, had had much success, when, in 1862, *Lady Audley's Secret*, the story of a golden-haired murderess, attained an enormous popularity, in three months reaching its eighth three-volume edition. *Aurora Floyd* (1863) was little less popular. Of all her fifty novels, perhaps the best is *Ishmael* (1884), a tale of the Second Empire, which depends not so much on sensation as character.

BRADFORD, a village of Massachusetts, situated on the south bank of the Merrimac, opposite Haverhill. It is the seat of Bradford Female Academy and of an excellent high school.

BRADFORD, a city of McKean county, Pa., on a branch of the New York and Erie railroad and also on the Rochester and Pittsburgh Railroad. It is 63 miles southeast of Dunkirk, N. Y. It has two national banks, fine hotels, two daily and weekly newspapers, several churches, excellent schools, a handsome park, water-works, streets well lighted with natural gas, and is noted for its many oil wells. It was incorporated as a city in 1879. Population in 1870, 1,446; in 1880, 9,197; in 1890, 10,478.

BRADFORD, a village of Vermont, situated on the Connecticut River, about thirty miles southeast of Montpelier. It is the seat of Bradford Academy and Union High School, and carries on important manufactures of paper, machinery, iron, flour, casks, and woolen goods.

BRADFORD CLAY: in geology, a subdivision of the Great Oolite (Lower Oolite), a blue, slightly calcareous clay, occurring at Bradford in England, and extending for some miles in the vicinity. It is about 10 feet thick at Bradford, but may be thicker at Farleigh. It is remarkable for the occurrence in it of large numbers of a crinoid, *Apicrinities Parkinsoni*. Although Bradford clay is considered a local deposit, yet deposits containing the same fossils occur in Dorsetshire. See *Britannica*, Vol. X, pp. 354, 335.

BRADFORD-ON-AVON, a town of England, situated on both sides of the Avon, and on the Kennet and Avon canal, nine miles southeast of Bath. It is an ancient town, and still shows some gable-fronted houses, built and roofed with stone. Formerly it was the seat of important woolen manufactures, and kerseymeres were first made here. The tiny church of St. Lawrence, built by St. Aldhelm between 675 and 709, is the only perfect building of pre-Norman times now remaining in England. Near by, on the site of Aldhelm's monastery, is the parish church of the Holy Trinity, of various dates from the 12th to the 16th century, and restored in 1865-'66. On the summit of Torr Hill are the ruins of a 14th-century chapel of the Virgin. In the neighborhood is the pleasant valley of Avon, with many picturesque spots. At Bradford, Cenwalh, king of the West Saxons, gained a great victory over the Welsh in 652. Population, 4,922.

BRADFORD, WILLIAM, colonial governor, born in Austerfield, Yorkshire, England, March, 1588, died in Plymouth, Mass., May 9, 1657. From childhood, he was religiously inclined, and at an early age joined the Puritan congregation at Scrooby Manor. See *Britannica*, Vol. XII, pp. 725, 726. Persecution arose in Nottinghamshire, and the Puritans, or Separatists, emigrated to Holland as they could find opportunity. See *Britannica*, Vol. XX, p. 608. After imprisonment and delay Bradford and his companions reached Amsterdam in 1608, and joined the colony there, which in 1609 removed to Leyden.

Bradford soon began to agitate the question of emigrating to Virginia, but not until 1620 was he able to put his scheme in practice, and on Sept. 5th

of that year 100 pilgrims took passage from Southampton on the *Mayflower*. (See Britannica, Vol. XII, p. 726.) Stormy weather drove the ship to the shores of Massachusetts, and taking this as an indication of the hand of Providence, they abandoned the idea of settling in Virginia and entered Plymouth harbor. On the death of Carver, the first governor, Bradford was chosen by the colonists to the office. With the exception of five years (which were not successive), he held the office from April 21, 1621, until his death.

A patent was obtained for the settlement from the New England council, in 1629. It was a grant of the Plymouth plantation to William Bradford, his heirs, associates, etc. In 1640 he made over the property to the body of colonists, reserving for himself no more than one settler's share.

Gov. Bradford was a man of culture and possessed some knowledge of the classics. His leisure was largely spent in writing, and after his death the interesting manuscripts were published. Among them were the following: *A Diary of Occurrences* (relating the history of the colony during the first year, and written with the help of Edward Winslow); *Some Observations of God's Merciful Dealings with Us in this Wilderness*; *A Word to Plymouth*; *Memoir of Elder Brewster*; and *History of Plymouth Plantation*.

BRADFORD, WILLIAM, painter, born in New Bedford, Mass., in 1827. Up to middle life he followed the mercantile profession, when he met with reverses and began to paint marine views as a means of livelihood. He had previously attained some artistic proficiency by practice in leisure hours. He does work in colors, India ink and oils. He made an Arctic excursion with Dr. Hayes and others, and from studies of snow, ships and icebergs then made he painted many famous scenes. Some of his best works are *Shipwreck Off Nantucket*; *Sudden Squall in the Bay of Fundy*; *The Coast of Labrador*; and *Sunset in the North*.

BRADING, a small but ancient town, once a parliamentary borough, in the Isle of Wight, four miles south of Ryde by rail. In 1880 the remains of a Roman villa, with a tessellated floor, were unearthed near the town. In the ruins, assumed to be those of the villa of the Roman governor, were found numerous coins and tiles; there are also traces of a whole row of buildings.

BRADLAUGH, CHARLES, a prominent social reformer, but vigorous anti-socialist, born in London in 1833, died Jan. 30, 1891. Early dependent upon his own efforts, he was in turn errand-boy, small coal merchant, and trooper at Berlin. Procuring his discharge, he returned to London in 1853, became clerk to a solicitor, and soon a busy secularist lecturer, and pamphleteer under the name "Iconoclast." In 1880 he was elected M. P. for Northampton. He at first refused to take the parliamentary oath, then offered to take it; but as he had been loud in his avowal of atheism, the House refused to allow him even to affirm. He was thrice reelected by Northampton, and at length, in 1886, having taken the oath, he was allowed to take his seat. In Parliament he gained respect by his strong sense and debating power, and he earned wide popularity by his agitation against perpetual pensions. Of Bradlaugh's writings the best known is his *Impeachment of the House of Brunswick*. His republication, in conjunction with Mrs. Annie Besant, of an old pamphlet, *The Fruits of Philosophy*, led in 1876 to a sentence of six months' imprisonment and a fine of £200, but the conviction was quashed on appeal during what proved to be Mr. Bradlaugh's last illness. On Jan. 27, 1891, a motion was made and carried in the House of Commons

that the action of Parliament, by which he was ejected from that body in 1880, be expunged from the record.

BRADLEY, REV. EDWARD, better known by the pseudonym of "Cuthbert Bede," was born at Kidderminster, England, in 1827, and educated at Durham University. He was successively rector of Denton, Huntingdonshire, of Shelton, near Oakham, and of Lenton, near Grantham. His facetious description of Oxford life in *Adventures of Verdant Green* (1853-57) has been exceedingly popular, and was followed by the *Book of Beauty* (1856), *Fairy Fables* (1858), *Glencraggan* (1861), *Tales of College Life* (1862), *Little Mr. Bouncer and His Friend Verdant Green* (1873), *Fotheringhay* (1885), etc., none of which have equaled his first book in popularity.

BRADLEY, JOSEPH P., LL. D., jurist, born in Berne, N. Y., March 14, 1813. In his youth his educational advantages were at first very meager, but a clergyman prepared him for college, and he pursued the course at Rutgers. He studied law, was admitted to the bar in 1839, and for a number of years practiced in Newark, N. J. His services were sought in important cases, and he was highly esteemed as an orator. In 1870 President Grant appointed him to the supreme court bench and circuit justice for the southern circuit; later he was assigned to the third circuit, comprehending the States of Pennsylvania, New Jersey and Delaware. While in the supreme court many and intricate cases came up for decision—civil war cases, maritime cases, and others of like importance. In 1877 he was a member of the electoral commission. He has never been a politician, but was a member of the Whig party and now of the Republican, always supporting the Government.

BRADSTREET, SIMON, colonial governor of Massachusetts from 1679 to 1686, and from 1689 to 1692, born at Horbling, Lincolnshire, England, in 1603, died at Salem, Mass., in 1697. He was educated at Cambridge, and, having been chosen assistant judge of the court to be established in the Massachusetts colony, sailed for the New World and arrived at Salem in 1630. During his public life of more than 60 years he held prominent and responsible government positions, in all of which he showed himself able and trustworthy. He visited England in 1660 as agent for the colony and to congratulate Charles II on his restoration. Bradstreet opposed the witchcraft delusion at Salem in 1692. He was one of the founders of Cambridge, and was connected with the settling of other of the early New England towns.

BRAEMAR, a highland district of Scotland, occupying the southwest corner of Aberdeenshire, in the heart of the Grampian Mountains, and traversed by the upper waters of the Dee. In the eastern part is Balmoral, and near its center, 61 miles southwest of Aberdeen, is the village of Castleton of Braemar, a favorite resort for travelers, sportsmen, and lovers of grand scenery. See Britannica, Vol. I, p. 44.

BRAG, a game at cards, so called because each player endeavors to impose upon the others, and to make them believe that his hand is better than it really is;—same as *poker* and *bluff*.

BRAGG, BRAXTON, soldier, born in Warren county, N. C., March 22, 1817, died in Galveston, Tex., Sept. 27, 1876. He graduated at West Point, and was appointed to military service in Florida during the Seminole war. He took part in the Mexican war, and was brevetted lieutenant-colonel for his gallant services during the campaign. From this time until the civil war he was mostly engaged in frontier service. In 1861, when the war broke out, he was commissioner of public works in Louis-



iana, and taking the Confederate side he was appointed brigadier-general and assigned to duty in Florida. On the death of A. S. Johnston at the battle of Shiloh he was promoted general. After the evacuation of Corinth he succeeded to General Beauregard's command. At Perryville, Ky., where he led a force of 45,000 men, he retreated after the battle without sufficient cause. He was on this account removed from command and arrested, but soon restored to rank. He was beaten at Murfreesboro, by Rosecrans Dec. 31, 1862, and Jan. 2, 1863, but retaliated at Chicamauga in September. Grant inflicted a severe defeat upon his troops at Chattanooga in November, and soon after he was relieved of command and called to Richmond as military adviser to Jefferson Davis. He performed no other important service during the war. Afterwards he became chief engineer of Alabama, and superintended the improvements in Mobile Bay.

**BRAGI**, in Northern mythology, son of Odin and Frigga, god of poetry and eloquence. Upon his tongue were engraved the runes of speech, so that he could not utter a sentence that did not contain wisdom. According to the elder or poetic Edda, he is the most perfect of all scalds or poets, and the inventor of poetry, which is designated by a kindred word, *bragr*. Bragi is represented as an old man with a long flowing beard, but his brow is always mild and unwrinkled. Together with Hermothe or Hermode, he receives and welcomes all those heroes who have fallen in battle, on their arrival in Valhalla. On festive occasions, as well as on the burial of a king, a goblet called Bragafull (Bragi's goblet) was presented, before which each man rose up, made a solemn vow, and emptied it. See Britannica, Vol. I, p. 211.

**BRAHMA**, Hindu deity. See Britannica, Vol. IV, p. 207; Vol. XXIV, p. 118.

**BRAHMANS**. Hindu caste. See Britannica Vol. V, p. 188.

**BRAHMANBARIA**, a town of India, Tipperah district, in the presidency of Bengal, on the Titas River. It has sea and railway communication with Calcutta, and some trade in rice. Population, 17,438.

**BRAHMS**, JOHANNES, born in Hamburg, Germany, in 1833. He is the greatest living composer. His father being a musician, Brahms received a thorough musical education, and at the age of 20 gave such signs of extraordinary powers that Schumann became convinced that he would be the man who would carry on the progressive development of modern music. During his youth he remained mostly in retirement, studying and composing. In 1861 he removed to Vienna. No comparison between Brahms and Wagner, the other great modern composer, is possible, as they have occupied different fields of activity. Wagner's fame is entirely founded on his operatic works, while Brahms has devoted himself to choral and chamber music, and is without a rival in these directions.

The genius of Brahms is conservative in spirit, contrary to Wagner and the so-called "school of the future;" he bases his art upon systematic principles of musical form, and it is only in style and construction, and the character of his ideas, that he differs from other composers. His intellectuality is intense, and will probably prevent his music from becoming popular with the great mass of music lovers, for he sometimes sacrifices beauty of sound to the more forceful expression of an idea.

His works have now reached Opus 108. The "Deutsches Requiem" and Symphonies are his greatest compositions. As a pianoforte player Brahms is well known, especially as an interpreter

**BRAID**, JAMES, born in 1795, in Fife, studied medicine at Edinburgh, and settled as a surgeon in Manchester, where he died March 25, 1850. He is noted for his researches on animal magnetism, which he named hypnotism. See Britannica, Vol. XV, p. 278.

**BRAIDWOOD**, a city of Illinois, about 20 miles south of Joliet. It is noted for its extensive mines of bituminous coal.

**BRAIDWOOD**, THOMAS, teacher of deaf mutes. See Britannica, Vol. VII, p. 6.

**BRAILLE**, LOUIS, the inventor of the Braille system of raised letters for the blind, was born near Paris, France, January, 1809. He became blind (the result of accident) at the age of three. In 1819 he became a pupil of the institution for the blind in Paris, and subsequently was elected a professor in the institution. While there he devised a system of points or raised dots, instead of raised lines, for the uses of the blind in reading or writing. See **BLIND**, **READING FOR**, in these Revisions and Additions.

**BRAIN-CORAL**, or **BRAINSTONE CORAL**, a popular name for corals of the genus *Meandrina*, family *Meandrinidae*, belonging to the aporeose division of stone-corals. The individual animals which compose the colony are arranged in long winding rows. Those of one row are not separated from one another by the usual round walls, and thus elongated continuous furrows are formed not unlike brain convolutions—hence the name. The entire shape is roughly hemispherical; the rate of growth slow; the total size often large. They are abundant in the West Indian Ocean. About 20 species of *Meandrina* are known, some living, others occurring from the chalk on to tertiary strata.

**BRAINE-LE-COMTE**, a busy town of the Belgian province of Hainault, on the Senne, 19 miles southwest of Brussels. It has an old church of the 13th century, cotton and corn mills, dye-works, breweries, etc. Some of the finest flax is grown in the district. Population, 8,176.

**BRAINERD**, a city of Minnesota, county-seat of Crow Wing county, about 115 miles west of Duluth. It contains the shops of the Northern Pacific.

**BRAINTREE**, Mass. Supplementary List, Vol. III.

**BRAKE**. See Britannica, Vol. IV, p. 211.

**BRAMA**, or **RAY'S BREAM** (*Brama raii*), a bony fish closely related to the *Coryphenas*, or "dolphins," and therefore nearly allied to the mackerel family. In this genus the body is laterally compressed and more or less deep. The spinous portion of the long dorsal fin is not well developed, and the tail is deeply forked. Ray's bream is found from the Cape seas northward to the Mediterranean, and even to British coasts. Its total length may be as much as two feet.

**BRAMBLE**, a name common to plants of the genus *Rubus*, in England the popular name for common blackberry, *Rubus fruticosus*. Brambles are little cultivated in Britain; but in America, where they are called blackberries, they are extensively cultivated for their fruit, and of late American varieties have been with advantage introduced into Britain. Species of *Rubus* very similar to the common bramble, or varieties of it, abound in the northern parts of Asia, and in the Himalaya Mountains.

**BRAMBLING BIRD**. See Britannica, Vol. IX, p. 193.

**BRAMHALL**, JOHN (1594-1663), a great anti-Puritan Irish prelate, born in 1594, and educated at Sidney-Sussex College, Cambridge. He was already sub-dean of Ripon, on the road to high preferment, when he went to Ireland as Wentworth's chaplain in 1633. He soon became archdeacon of

Meath and was consecrated Bishop of Derry in 1634. Bramhall's intolerance roused the wrath of the stubborn Scotch settlers in his diocese, and ruined the king's cause in Ulster. When the civil war broke out, for safety's sake, he crossed to England, but the Royalist disaster soon drove him to the continent. The Restoration gave him the metropolitan see of Armagh, which he filled till his death in 1663. Bramhall closely imitated Laud in policy, but was far his inferior in intellect. Not strong, but merely obstinate in purpose, the so-called Athanasius of Ireland, by his impolitic intolerance, sealed the doom of episcopalian supremacy in Ulster. See *Britannica*, Vol. XII, p. 36; Vol. XIII, p. 266.

BRAMPTON, a very ancient town of Cumberland, England, nine miles northeast of Carlisle by rail. The chief manufacture is the weaving of checks and ginghams. There are coal mines in the vicinity. Two miles to the east stands Lanercoast Abbey, founded in 1169.

BRAMPTON, a village of Ontario, county-seat of Peel county, about 20 miles west of Toronto. It is an important grain and flour market, and contains also manufactories of iron, of agricultural implements and of pumps.

BRANCHIOFODA, as defined by Huxley, a sub-order of crustaceans. See *Britannica*, Vol. VI, p. 463.

BRANCO RIO, a river of northern Brazil, which rises in the Parima Mountains, on the very borders of Venezuela; and after a southerly course of about 400 miles joins the Rio Negro, of which it is the principal tributary.

BRAND JOHN (1744-1806), antiquary, born in Durham county, England, Aug. 19, 1744, was apprenticed to a cordwainer in Newcastle, and educated at the grammar school there. His industry procured him patrons, who sent him to Oxford, where he graduated B. A. in 1775. He had been ordained some years previously, and in 1784 he was presented to a rectory in London, and in the same year was elected resident secretary of the Society of Antiquaries, to which office he was reelected annually until his death, Sept. 11, 1806. His *Observations on Popular Antiquities*, first published in 1777, and edited with additions by Sir Henry Ellis (three volumes 1813; new edition by W. C. Hazlitt, 1870), is considered the best work on its subject in the English language.

BRANDES, GEORG, a Danish literary critic of Jewish family, born in Copenhagen, Feb. 4, 1842, and graduated there at the University in 1864. Several books on æsthetic and philosophic subjects brought on him a charge of skepticism, which was not removed by an epoch-making series of lectures, delivered before large audiences, and published under the title, *The Great Tendencies of Nineteenth Century Literature* (1872-75); for his description of the later intellectual position of Europe, as broken away from the orthodoxy and romanticism of the beginning of the century, brought on him the bitter attacks of all the reactionary forces in Denmark. His *Danske Digtere*, a masterpiece of psychological analysis, appeared in 1877. The hostility of his enemies induced him in the same year to leave Denmark, and settle in Berlin, where he published, among other works, *Critical Biographies of Lassalle* (1877), *Essays Tegnér* (1878), and *Lord Beaconsfield* (1879). A lecture tour through Norway and Denmark brought a powerful party to his side, and in 1882 he returned to Copenhagen, his countrymen having guaranteed him an income of 4,000 crowns, with the one stipulation that he should deliver public lectures on literature. His later works include *Den Romantiske Skole i Frankrig* (1882) and a

biography of *Ludwig Holberg* (1885). See *Britannica*, Vol. VII, p. 93.

BRANDING has been practiced from very early times. The Greeks marked their slaves with the stigma; in Rome, runaway slaves (*fugitivi*) and thieves (*fures*) were branded with the letter F; and the slaves who worked in the mines, and convicts condemned to the galleys or to the mines, were also branded on the forehead for identification. Constantine limited branding to the hand, arm or calf. The canon law provided for this punishment, and in France, down to 1832, galley slaves were marked T F (*travaux forcés*); but in Germany it has never been recognized by common law. The famous Statute of Vagabonds under Edward VI of England authorized the branding of the letter V on the breast of a runaway servant, and in the same reign brawling in church was punished by branding with the letter F on the cheek as a fraymaker. During the three centuries of persecution to which the gypsies were subjected throughout Europe, this was considered a mild form of punishment. From 1698 to 1707 theft and petit larceny were punishable by branding in the left cheek. This form of punishment was discontinued in the reign of George III, and finally done away with in 1829. Army "branding" or "marking" with the letter D or B C (deserter or bad character), by tattooing with needles and Indian ink, not by burning, was abolished in 1879.

BRANDON, a quaint old market-town of England, situated on the Little Ouse, 86 miles northeast of London. In the neighborhood are the *Grimes Graves*, demonstrated by Canon Greenwell to be Neolithic flint-workings. Gun-flints are still made here, chiefly for the African market; and the continuity of this industry can be traced at Brandon in unbroken sequence to the early prehistoric periods, when the flint was excavated with stone tools and picks made of the antlers of the red deer. Population of parish, 2,309.

BRANDYWINE CREEK, a stream rising in Chester county, Pa., flowing with a general southeasterly course into Delaware, and emptying into Christiana Creek at the city of Wilmington. During the War of Independence a battle was fought on its banks, Sept. 11, 1777, in which 13,000 Americans under Washington were defeated by a force of 18,000 British under Lord Howe.

BRANFORD, a manufacturing town and summer resort of Connecticut. It is situated on Long Island Sound, eight miles east of New Haven. It has a good harbor, a granite quarry and various manufactures, and is the seat of an academy.

BRANK, or BRANKS, an instrument formerly used for the punishment of scolds in England and Scotland, and often in the former country called "the scold's bridle," or "gossip's bridle." When the brank first came into use is unknown, but it is found at Edinburgh as early as 1567. According to Mr. Llewellynn Jewitt it was never a legalized instrument of punishment, although corporations and lords of the manor in England, and town councils, kirk-sessions, and barony courts in Scotland, exercised the right of inflicting such punishment. Men were put in the stocks or pillory, women in the branks, for such petty misdemeanors as are now termed breaches of the peace, using abusive, insulting or threatening language, cursing and swearing, and contumacy.

The brank in its simplest form is a hoop of iron, opening by hinges at the sides, so as to inclose the head, and fastened by a staple with a padlock at the back; a plate within the front of the hoop projecting inwards, so as to fit into the mouth of the culprit, and by pressing upon the tongue, be an



effectual gag. The brank was used at Longholm, in Dumfriesshire, in 1772; at Morpeth in 1741; it was used at a later date at Manchester and at Macclesfield; and at Bolton-le-Moors in 1856 the iron bridle was stated to be "not many years since in use" for the correction of immorality. Brank was at one time a common name in Scotland for any sort of bridle, and the word is so used by Burns.

BRANT, JOSEPH, called Thayendanagea, a Mohawk chief, born on the banks of the Ohio in 1742, died at the old Brant mansion, Wellington square, Canada, Nov. 24, 1807. His father was a full-blooded Mohawk Indian. The son, being a favorite with Sir William Johnson, was sent at his expense for a year's tuition in the "Moor Charity School," which afterwards became Dartmouth College. He was employed by General Carleton in making raids on the colonists during the Revolutionary war; the Cherry Valley and Minisink massacres were participated in by him. At the head of a clan of Hurons he marched against Fort Stanwix and afterwards took part in the battle of Oriskany (1779). When the war closed he used his influence for peace and helped the Indian commissioners to secure a treaty with the Miamis. He was a convert to Christianity, and helped raise funds by visiting England (1786) for the erection of the first Episcopal church in Upper Canada. The Gospel of St. Mark and the "Book of Common Prayer" were translated by him and Colonel Daniel Claus into the Mohawk language. He is said to have been faithful to a friend, a cautious warrior, an accomplished diplomat, and humane to a captive. At Brantford, Canada, a monument was erected to his memory in 1886.

BRASSEY, THOMAS, BARON, K. C. B., son of the great railway contractor, born at Stratford, England, in 1836. He was elected to Parliament for Devonport in 1865, and afterwards represented Hastings (1868-86). As Civil Lord of the Admiralty (1880) and Secretary (1884), his influence has been felt in naval questions, and he is author of several works on seamanship and naval affairs. He was made K. C. B. in 1880, and was raised to the peerage in 1886. He is a veteran yachtsman; and Lady Brassey's pleasant records of their yacht voyage round the world in 1876-77, and of succeeding trips of the *Sunbeam*, were widely popular. She died on the homeward voyage from Australia, Sept. 14, 1887, and was buried at sea. Lord Brassey is author of *Work and Wages* (1872), *British Seamen* (1877), *The Eastern Question* (1878), *Foreign Work and English Wages* (1879), *The British Navy* (five vols., 1882-83), etc..

BRASSICA, the turnip and cabbage genus of *Cruciferae*, containing about 100 species, all natives of Europe and Northern Asia. The cultivated species are of great economic importance. *Brassica oleracea* gave rise to all the forms of cabbage, cauliflower, kale, kohlrabi, broccoli, etc. *Brassica campestris* (see *Britannica*, Vol. XII, p. 288) is the source of the turnip and the rutabaga, in which the nourishment is stored in the root, and of the colza and rape, which are raised for the oil of the seed. *Brassica alba* and *Brassica nigra* are the white and black mustards. See CABBAGE, *Britannica*, Vol. IV, pp. 617, 618.

BRATHWAITE, RICHARD, minor poet, born in Westmoreland, England, about 1588, died near Richmond, in Yorkshire, in 1673. He entered Oriel College, Oxford, at sixteen; passed afterwards to Cambridge and thence to London, where he devoted himself to poetry and play-writing. In 1611 he published *The Golden Fleece*, a collection of poems, and in 1614 three works, one of them a book of pastorals, en-

titled, *The Poet's Willow*. In 1615 he published the collection of satires, *A Strappado for the Devil*, in imitation of *The Abuses Whipt and Stript* of George Wither. The latter part of his life was spent in Westmoreland and Yorkshire, where he lived the life of a country gentleman, without, however, ceasing his literary activity. Of his numerous books the most noteworthy one is *Barnabe Ruminarium*, or *Barnabe's Journal*, published in 1638, and often reprinted under the title of *Drunken Barnaby's Four Journeys*. This lively book, in rhymed Latin and doggerel English verse, was popular in the 18th century, and had the honor of an eleventh edition in 1876.

BRATTLEBORO, a beautiful town of Vermont, is situated on the Connecticut River, about eighty miles south of Rutland. It is the seat of the Vermont Asylum for the Insane. It is an important center of trade, and contains extensive manufacturing of organs, machinery, furniture, and carriages.

BRAUN, ALEXANDER, born at Ratisbon, Bavaria, in 1805, professor of botany at Berlin from 1852 till his death, March 29, 1877. He did special service in the departments of the morphology of plants, systematization, and the lower cryptogams.

BRAUN, AUGUST EMIL, archaeologist, born at Gotha in 1809, died in Rome, Sept. 12, 1886. He studied at Göttingen and Munich, and in 1833 went to Rome, where in a short time he was made secretary to the Archaeological Institute. He wrote many valuable works on art and mythology in German and Italian. Of these the most important are his *Vorschule der Kunstmythologie* (1854), and an admirable guide-book, *Die Ruinen und Museen Roms* (1854), both of which have been translated into English.

BRAVO ("excellent!" "well done!"), an Italian exclamation of praise, the superlative form of which is *bravissimo*. It is commonly used in England without distinction of number or gender; but the Italians say *bravo!* to a male singer or actor, *brava!* to a lady, and *bravi!* to a company of singers.

BRAVOES, those persons in Italy, but especially in Venice, who undertook to perform any dangerous deeds for money. The name is now employed chiefly to designate hired assassins.

BRAVURA, an Italian word, in music applied to a composition as well as a style of performance. As a composition, the bravura is a florid air or song, with many difficult and rapid passages, requiring great spirit and dexterity of execution. The term is chiefly applied to vocal compositions, but occasionally to instrumental.

BRAWLING IN CHURCHES, in English law, was an old statutory offense in the ecclesiastical courts. If it was committed by words only, the bishop might exclude a lay offender from church, and might suspend a priest. In more serious cases excommunication and branding were the punishment. Anglican priests may still be punished for such conduct by their own courts; but the riotous, violent, or indecent conduct of laymen in any place used for religious worship is dealt with by the ordinary criminal courts.

BRAXTON, CARTER, signer of the Declaration of Independence, born in Newington, King and Queen county, Va., Sept. 10, 1736, died in Richmond, Va., Oct. 10, 1797. He inherited a large estate, and was educated at William and Mary College. In 1761 he entered the house of burgesses and remained in the public service until his death. He supported Patrick Henry's stamp-act resolutions, and favored independence. He was a member of the last house of burgesses; of the general convention at Richmond (July 17, 1775), which organized the militia;

and in December, 1775, when the president of the Continental Congress died, Mr. Braxton was chosen for the office. He signed the Declaration of Independence July 4, 1776. In 1777, 1779, 1780, 1781, 1783 and 1785 he was a member of the House of Delegates. In 1786 he was chosen to the council of state; and in 1791 he was elected to the legislature; and from 1793 until his death he served as a member of the executive council of the General Assembly. Mr. Braxton's fortune was greatly reduced by the events of the Revolutionary war and the depreciation of the currency.

BRAY, ANNA ELIZA (*née* Kempe), author, born in London, England, Dec. 25, 1790, died there Jan. 21, 1883. She studied for the stage, but in 1818 married the artist Charles Alfred Stothard, whose death occurred in 1821 (see *Britannica*, Vol. XXII, p. 578). In 1825 she married the Rev. E. A. Bray (1778-1857), vicar of Tavistock, and after his death settled in London. Between 1820 and 1874 she published a score of romances, books of travel, and other works, the best being *The Borders of the Tamar and the Tavy* (1836); *Life of Thomas Stothard, R. A.* (1851); and *A Peep at the Pixies* (1854).

BRAZIL, UNITED STATES OF, a republic of Central South America. Area, 3,218,032 sq. miles; population (estimated in 1888), 14,002,335; capital, Rio Janeiro, with a population of 357,332. For the early history, productions, and government of Brazil, see *Britannica*, Vol. IV, pp. 221-240.

In 1887, an official estimate gave the white population at about one-third of the total population; slaves, 1,500,000; the remainder were mulattoes, half-castes, freed negroes, and nomadic Indians. In 1888 a law was enacted freeing the slaves, and since that date every person in that great country has been permitted to claim the right of citizenship.\*

Brazil contains 20 States, 16 of which have a coast frontage. The following table gives the names of the States, their areas, severally, and their populations in 1888:

| States.                                | Area:<br>English<br>sq. mile. | Popula-<br>tion, 1888. | Density<br>per sq.<br>m., 1888. |
|----------------------------------------|-------------------------------|------------------------|---------------------------------|
| Amazonas.....                          | 732,460                       | 80,654                 | 0.11                            |
| Pará.....                              | 443,638                       | 407,350                | 0.91                            |
| Maranhão.....                          | 177,666                       | 488,443                | 2.7                             |
| Piauí.....                             | 116,218                       | 266,933                | 2.2                             |
| Ceará.....                             | 40,233                        | 952,625                | 23.6                            |
| Rio Grande-do-Norte.....               | 22,195                        | 308,832                | 13.9                            |
| Parahyba.....                          | 22,854                        | 496,618                | 17.0                            |
| Pernambuco.....                        | 49,625                        | 1,110,831              | 22.0                            |
| Alagoas.....                           | 22,583                        | 459,371                | 20.0                            |
| Sergipe.....                           | 7,370                         | 232,640                | 31.0                            |
| Bahia.....                             | 164,649                       | 1,821,089              | 11.0                            |
| Espírito Santo.....                    | 17,312                        | 121,562                | 7.0                             |
| Rio de Janeiro.....                    | 26,634                        | 1,164,463              | 43.7                            |
| Município Neutro (City of<br>Rio)..... | 538                           | 406,958                | 756.0                           |
| Santa Catharina.....                   | 27,436                        | 236,346                | 8.6                             |
| Rio Grande-do-Sul.....                 | 91,335                        | 564,527                | 6.18                            |
| Minas Geraes.....                      | 222,160                       | 3,018,507              | 13.58                           |
| Matto Grosso.....                      | 532,708                       | 79,750                 | 0.149                           |
| Goyaz.....                             | 288,546                       | 211,721                | 0.77                            |
| Paraná.....                            | 85,452                        | 187,548                | 2.19                            |
| San Paulo.....                         | 112,330                       | 1,386,242              | 12.34                           |
| Total.....                             | 3,209,873                     | 14,002,335             | 4.36                            |

\* Brazil was the last American country to abolish slavery. The number of slaves had greatly decreased since the year 1850, when they were estimated at 2,500,000. On March 30, 1887, the official return gave the number of slaves in Brazil as 723,419, of the legal value of \$485,225,212. On May 13, 1888, the Crown Princess, as regent, gave the royal assent to a short measure of two clauses, the first declaring that slavery was abolished in Brazil from the day of the promulgation of the law, and the second repealing all former acts on the subject. Both Chambers refused to consider the claim for compensation made by the slave-owners.

The apparent increase in 16 years (from 1872 to 1888), was 41 per cent., or at the average rate of 2.56 per cent. per year. In 1888 the latest estimated population of the chief cities other than the capital was as follows: Bahia, 140,000; Pernambuco, 130,000; Pelotas, 45,000; Belem, 40,000; San Paulo, 40,000; Campos, 40,000; Campinas, 35,000; Maranhão, 35,000; Porto Alegre, 35,000; Carateba, 34,000; Ouro Preto, 20,000.

In 1888 there were 5,281 miles of railway open, and 869 miles in course of construction; also 7,605 miles of telegraph wire, and 1,816 post offices. It is unequalled for the number and extent of its rivers. The Amazon, though not the longest, is with its tributaries, the largest in the world.

The public debt of Brazil on Nov. 15, 1889, was officially reported as follows:

|                             |               |
|-----------------------------|---------------|
| Foreign Debt.....           | \$152,097,500 |
| Internal Funded Debt.....   | 305,766,730   |
| Internal Floating Debt..... | 140,794,185   |
| Total.....                  | \$598,658,415 |

Later, some additions to the above were made, and in December, 1889, a further loan of \$100,000,000 was successfully floated.

The Brazilian army in 1888 consisted of 18,000 men, on a peace footing, and the navy of 59 vessels, inclusive of 9 ironclads, 17 gun-boats, and 9 torpedo boats.

As explanatory and preparatory to the more recent and most radical changes in the Brazilian government we summarize in this connection a few salient items of the earlier history. The territory was acquired by Portugal early in the sixteenth century, and resolutely held by her against all claimants. When the French over-ran Portugal in 1807, the royal family took refuge in Brazil. In 1815 the exiled monarch Dom João, issued a formal decree declaring the colony to be a part of "the Kingdom of Portugal, Brazil, and the Algarves," and thenceforward assumed the title of "King of Brazil." In 1821 he returned to Portugal leaving his son Dom Pedro as regent of Brazil. There had been for some time a tendency toward separation, and in 1822, when the Portuguese Cortes adopted a resolution requiring Dom Pedro to return to Lisbon, a crisis was precipitated, and the Brazilians declared for independence. Dom Pedro put himself at the head of the movement, and summoning a general council he was declared by that body to be "Constitutional Emperor and Perpetual Defender of Brazil." In 1824 a constitution was adopted by the Emperor and a vote of the people. A year later the independence of Brazil was recognized by Portugal. In 1834 a law was passed giving a federal character to the empire, delegating to the provincial assemblies, both legislative and executive, authority within the provinces. The presidents, however, were to be appointed by imperial selection. The constitution declared that "The Empire of Brazil is the political association of all Brazilian citizens," and that "the representatives of the Brazilian nation are the Emperor and the General Assembly."

Among the powers of the General Assembly were these: "To receive the oath of the Emperor, Prince Imperial, or Regent, or Council of Regency; on the death of the Emperor, in the event of the throne becoming vacant, to institute an inquiry into the administration which has come to an end, and to reform the abuses which have crept in; to select a new dynasty should the present fail; to make, interpret, suspend, or abrogate the laws; to take measures for the maintenance of the Constitution, and for the general welfare of the nation."

The imperial dynasty continued until Nov. 15, 1889, when, with remarkable unanimity by the



principal citizens in the national capital, a declaration was adopted in favor of a republic, and a provisional government assumed control. The revolution was sudden and bloodless. The Emperor was regarded as a very weak personage, but as one having good intentions, and patriotic purposes toward all the people. He was, therefore, most kindly treated, and most generous provision was made for his support. Lest his presence should open the door for trouble during the reorganization of the government, he was transferred to his kindred in Portugal.

The preference of the people was for a republic, formed on the American model, and hence the provisional administration immediately and vigorously proceeded to formulate a new constitution on the general plan of that of the United States. The draft of the new constitution was promulgated June 23, 1890, under the provisional presidency of Marshal Deodoro da Fonseca. There was no serious trouble in the administration—everything went on as usual; the imperial officials became republicans; most of the ambassadors to foreign courts continued at their posts; only a few important changes were made.

The proposed constitution provided for a president and vice-president, elected indirectly through an electoral college for six years; two legislative chambers, a senate, elected by the State legislatures for nine years, and a chamber of deputies, elected by popular vote for three years; a supreme federal tribunal of fifteen judges, appointed for life, and a federal judicial system; a federal district for the national capital, like the District of Columbia, but with privileges of representation in the two chambers and in the presidential electors like any State; the transformation of the old provinces into self-governing States; universal suffrage to all (except illiterates, mendicants, soldiers, rank and file, and members of religious orders, companies, congregations or communities who owed obedience to the same to the prejudice of their personal liberty); guarantees for life, property, and political rights; responsibility of the president and his cabinet before the law; religious freedom and separation of church and state, obligatory civil marriage, etc. The President of the federation was declared alone responsible to the nation, and the ministers were replaced by secretaries of state answerable to the President alone. The powers of the two chambers were to be purely legislative and moderating, so that an adverse vote in either house would not necessarily entail a change of ministry. This scheme was to be submitted to the constituent assembly in November, for which the elections took place in September, 1890, the supporters of the provisional government obtaining a large majority at the polls. As the result of these elections it was declared that the adoption of Republican institutions had been confirmed by the people, and that the Republic had thus been placed upon a firm basis.

The principal acts of the provisional government during the year were of a financial character. On August 2d a decree was issued establishing a National Mortgage Bank, with a capital of 100,000 contos of reis in gold. On the 30th of the same month the Bank of the United States of Brazil was authorized to issue an additional 50,000,000 milreis in currency on a gold basis, it being explained that speculative enterprises on foot required this increase of the currency. On September 3d a decree was issued granting a government guarantee on State loans, amounting in the aggregate to 50,000,000 milreis; and on October 3rd it was announced that, from November 15th, all import duties were to be paid in gold, a decision which it was stated would bring eleven millions sterling annually into the treasury.

At the meeting of the deputies to the First National Assembly, the proposed Constitution was submitted to a commission composed of one deputy from each State in the Republic, and was favorably reported back to the National Assembly and discussed at great length, numerous amendments being proposed and adopted or formally rejected. The first section of the Constitution was adopted about the middle of January, 1891. The next formal act of the new Republic was the election of General da Fonseca as first "President of the United States of Brazil." He had been identified with all the important movements of the provisional government during the whole revolutionary period, and had manifested not only great sagacity and courage, but also sound sense, moderate temper, and commendable fairness of spirit. He had met all the trying difficulties of his chief executive position in such a statesmanlike manner that this critical period of transition was passed by the whole country in entire peacefulness. Indeed, as one of the leading journals expressed it: "The whole country seemed to have been during this period a great debating school, where the utmost freedom of opinion and of speech had been permitted to all parties. In all pos-

sible ways, so that no occasion for complaint was given to any State or person in the Republic." The completed constitution was formally adopted by the Assembly, Feb. 24, 1891, and the United States of Brazil thenceforward was constituted a government in law as well as in fact. The new flag of the new Republic is of green color with a large yellow lozenge, in the center of which is a blue sphere; crossing the sphere is a white ribbon inscribed "Ordem e progresso" in green letters. Twenty white stars, indicating the twenty States, are arranged in the form of the southern constellations, the Cross and the Scorpion, while another large star is intended to symbolize the capital—Rio de Janeiro.

In the autumn of 1891 President Fonseca, affirming his belief that the political condition of the country required for a temporary period a stronger centralized government, practically assumed a dictatorship and issued a manifesto dissolving the Congress which had refused to execute his wishes.

As had also been the case in the troubles in Chili and the Argentine Confederacy, bad financiering had much to do with the political disturbances. The majority in the Brazilian Congress favored an extension of English loans, which had been steadily opposed by President Fonseca. Exercising his undoubted constitutional right, he vetoed several important financial measures of the Congress, and also laws intended to restrict his own actions within constitutional limits, and then, incensed at its attempt to overrule his views, he dispersed the Congress by force, and seized upon the reins of government. Fonseca thus became, to all intents and purposes, a dictator, though he insisted that he was warmly attached to the republican form of government, and that he would call for new elections of representatives in the national legislature not later than next January. He intimates also that the opposition was engaged in plots for a restoration of the empire. The great body of the people, however, refused to follow his lead, and rose against him, compelling him to resign, leaving the executive government in the hands of Vice-President Peixotto, who became his constitutional successor. Peixotto has promulgated a manifesto which has given great satisfaction, in which he disowns any claim to arbitrary or dictatorial authority, and declares that the legal order of affairs is restored. It declares the state of siege raised, and summons the old Congress to reassemble on Dec. 18. In his message to Congress, President Peixotto stated that the Brazilian people during the events of Nov. 23 (the date of Fonseca's resignation and President Peixotto's accession to the presidency) showed their jealous regard for the national liberties which were threatened by Fonseca. It is now the duty of Congress, the President declares, to deal with the existing commercial crisis by perfecting a reorganization of the banking system. He estimates the deficit in the budget of 1890 at 30,000 contos of reis. For the current financial year the deficit would be slight.

**BRAZIL**, a mining and manufacturing town of Indiana, county-seat of Clay county, situated about 15 miles east of Terre Haute. It contains extensive manufactories of pig-iron and numerous mines of block-coal. There are also manufactories of boilers, terra-cotta, pottery, chairs and flour.

**BRAZZA**, **PIERRE SAVORGAN DE**, an African explorer, born at Rome in 1852. He studied at Paris, entered the French navy in 1870, and served in Africa on the Gaboon station. In 1876-78 he made a famous exploration of the Ogoway and of some of the northern tributaries of the Congo. In 1878 the French government gave him 100,000 francs for exploration of and the promotion of French interests in the country of the Congo, where he secured vast grants of land for France and

founded several stations, that called Brazzaville, being on the northern shore of Stanley Pool. In 1883 he returned to extend the territory secured to France, this time with a government grant of 1,275,000 francs, besides stores and provisions of all kinds; and by the end of 1885 he had established 26 stations, of which Franceville was the chief. The securing for France of her great dependency in Africa, lying between the Gaboon and the Congo, is mainly his work; and of that dependency he was made governor in 1886.

BREAD. See BAKING, Britannica Vol. III, pp. 250-53.

BREAD-NUT, the fruit of the tree *Brosimum alicastrum*, natural order *Urticaceae*, a native of Jamaica, closely allied to the bread-fruit. The bread-nut tree is dioecious, with ovate-lanceolate evergreen leaves, and abounds in a tenacious gummy milk. Its leaves and young shoots are eaten by cattle, but deleterious qualities are said to be developed in them as they become old. The fruit is a one-seeded drupe, and the kernels, boiled or roasted, form an agreeable article of food, and are eaten instead of bread. Their taste resembles that of hazel-nuts. Another species, *Brosimum galactodendron*, is the cow-tree of South America. *Brosimum aubletii* of British Guiana and Trinidad yields heartwood of a deep mottled brown, hence called letterwood, snakewood, or leopardwood. It is chiefly used for veneering.

BREAKING BULK, in Scots law, signifies making use of an article supplied in bulk, or in quantity, by which act one is said to break bulk, and is in consequence prevented from afterwards objecting to it, and returning it to the seller.

BREAKING INCLOSURES, the technical name of an old statutory offense in Scotland, which consisted of injuring plantations or breaking their inclosures. Special punishments were provided for the purpose of favoring planting and inclosing, in the 17th century. The offense would now be termed malicious mischief.

BREAM, a popular name applied to three very different kinds of fish, but especially to the freshwater bream (*Abramis brama*), a common little European fish, nearly allied to the bleak. It has an elongated, laterally compressed body, a short blunt snout, and long anal fins. The color varies from silver gray to brown. It may measure over a foot, and usually weighs between two and four pounds, though often more. It is little valued for food. The white bream (*Abramis blicca*) is another European species, much like the preceding. Quite distinct from these is the large family of sea-brems or *Sparidae*, represented in England by the species *Sparus*, *Pagrus*, *Pagellus*, and *Cantharus*, and in the United States by *Lagodon rhomboides* the sailor's-choice, and *Diplodus holbrooki*, the pinfish. The term bream is also applied to *Brama raii*, a widely distributed fish of the mackerel family.

BREASTPLATE, also called *breast-plate of judgment*, an ornament worn by the Jewish high-priest. See Britannica, Vol. X, p. 138.

BREASTPLATE, in ancient armor, a plate of iron, steel, or other metal, so fastened as to protect the chest of the wearer. It was not commonly used until the early part of the 16th century, when armor for the limbs was being abandoned.

BRECCIA, in geology, a term adopted from the Italian to designate a conglomerate in which the fragments are angular instead of being rounded. See Britannica Vol. X, p. 237. The term is most commonly applied to masses composed of such fragments as have become cemented together before being rounded by friction. Bones and fragments of bones cemented together by calcareous matter

often occur upon the floors of caves in limestone; these accumulations are termed *bone-breccia*.

BRECKENRIDGE, an important mining town of Colorado, county-seat of Summit county, situated on Blue River, on the western slope of the Rocky Mountains, about 20 miles northeast of Leadville. Its history is coincident with that of the latter city. The surrounding country was one of the rich and populous placer-mining diggings of 1859-60; it is now a leading producer of silver, copper, and lead, as well as gold, and contains numerous smelters, mills, and sampling works.

BRECKENRIDGE, JOHN, clergyman, born at Cabell's Dale, Lexington, Ky., July 4, 1797, died there Aug. 4, 1841. He was a graduate of Princeton, was licensed to preach (1822), was chaplain to Congress (1822-23), and pastor of a church in Lexington (1823-27), when he began the publication of a religious newspaper called the "Western Luminary." In 1831 he was appointed secretary and general agent of the board of education of the Presbyterian church, and five years later he was called to the chair of theology at Princeton. He engaged in a printed controversy with Archbishop Hughes on the question "Is the Roman Catholic Religion in any or in all its Principles or Doctrines inimical to Civil or Religious Liberty?" Mr. Breckenridge was a keen debater and engaged in the controversies of the Presbyterian church. He upheld old-school doctrine, and was the author of numerous polemical writings. Excessive work caused his death just after he was called to be president of Oglethorpe University, in Georgia.

BRECKENRIDGE, JOHN CABELL, vice-president of the United States, born near Lexington, Ky., Jan. 21, 1821, died in Lexington, May 17, 1875. His grandfather was a United States Senator and attorney-general. He was educated at Center College, Danville, and at the Transylvania Institute, and then practiced law in Lexington. He served in the Mexican war, and on his return was sent to the legislature and to Congress, 1851-53. He was elected to the vice-presidency when Mr. Buchanan became president. At the conclusion of his term of office he was nominated (1860), for the presidency by the Southern delegates to the Democratic convention; Northern delegates at the same time nominating Stephen A. Douglass. Mr. Lincoln was elected, receiving 180 votes in the electoral college against 72 in favor of Breckenridge. In 1861 he became U. S. Senator and defended the Confederate cause in that official body. He joined the rebel troops in the same year, and was expelled from Congress. He was at the battles of Shiloh, Baton Rouge, Murfreesboro, Chickamauga, Chattanooga, Cold Harbor, and in other engagements. In 1865 he was Confederate Secretary of War. At the close of the war he escaped to Florida Keys, thence to Cuba and to Europe. Returning in 1868, he devoted himself to his profession. He was the youngest man ever elected to the office of vice-president, being at that time 35 years old.

BRECKENRIDGE, ROBERT JEFFERSON, clergyman, born in Cabell's Dale, Ky., March 8, 1800, died in Danville, Ky., Dec. 27, 1871. He studied at Princeton, Yale, and Union Colleges, and graduated at the latter in 1819. He read law, and practiced in his native State for eight years. Four years he sat in the legislature, then he abandoned politics, and began a private study of theology. His first pastorate was at the Second Presbyterian church in Baltimore, where he remained 13 years. He became president of Jefferson College, Pa. (1845); then was chosen (1847) superintendent of public instruction for Kentucky, whither he had removed in the same year. The new theological seminary of Danville



called him to the chair of didactic and polemic theology, and here he remained till his death. He was an eminent theological disputant, and in politics was anti-slavery and intensely loyal.

**BRECKNOCK**, or **BRECON**, the capital of Brecknockshire, South Wales, situated in an open valley in the middle of the county, at the confluence of the Usk and Honddu, 183 miles northwest of London by rail. It lies in the midst of fine mountain scenery, the triple-peaked Brecon Beacons (2,910 feet) rising to the south. The town was founded by Bernard de Newmarch, who built a castle here in 1094. Flannels, coarse woollens, and hats are manufactured. Population, 6,247.

**BREDERODE**, **HENRY**, COUNT OF (1531-68), born in Brussels, December, 1531. He was a leader of the disaffected nobility in the struggle against Spain. He drew up the "Compromise" of 1566, and headed the deputation to which the name Gueux was first applied. He was active in organizing the fraternity, but the failure of an attempt in the following year to raise an armed revolt in Amsterdam obliged him to flee to Germany, where he died at Recklinghausen, Aug. 24, 1568.

**BREE**, **MATTHIAS IGNATIUS VAN**, a Flemish painter, was born at Antwerp in 1773, died Dec. 15, 1839. In 1797 his *Death of Cato* gained for him the *Prix de Rome*, which entitled him to study in Italy. On his return to Antwerp in 1804, he became director of the Academy of Fine Arts. His chief works are the *Entrance of Napoleon into Antwerp*, the *Death of Rubens*, in the Antwerp Museum, and *Patriotism of the Burgomaster at the Siege of Leyden*, 1576, in the town-house of Leyden.

**BREEDÉ**, a river of South Africa in Cape Colony, rising in the Warm-Bokkerveld, and flowing south-eastward into the sea at Port Beaufort, about 60 miles northeast of Cape Agulhas. It is one of the largest rivers of the colony, but its navigation is impeded by a bar at its mouth.

**BREHM**, **ALFRED EDMUND**, naturalist, born at Renthendorf, in Thuringia, Feb. 2, 1829, died there Nov. 11, 1884. He was son of the pastor there, Christian Ludwig Brehm (1787-1864), a noted ornithologist. After five years of travel in Africa, Brehm went to Jena and Vienna to study natural science, and subsequently traveled in Spain, Norway, Lapland, Siberia, and Turkistan. In 1863 he became keeper of the Hamburg Zoological Garden, and in 1867 founded the Berlin Aquarium. His greatest work is the *Illustriertes Thierleben* (2d edition, 10 volumes, 1876-79).

**BREISACH**, **ALT**, a town of Baden, situated on an isolated basalt hill (804 feet) on the right side of the Rhine, 14 miles west of Freiburg. The *Mons Brisiacus* of Caesar, it was taken by Ariovistus when he invaded Gaul; being regarded as the key to the west of Germany, it figured prominently in the wars of the 17th and 18th centuries. The minster is a 13th century structure, with several old monuments. Population, 3,106.

**BREISGAN**, a German district which in the middle ages extended along the right bank of the Rhine, from the episcopal territory of Strasburg to Basel, embracing Freiburg and the southern Black Forest. Since 1810 it has been part of Baden.

**BREITENFELD**, a village of Saxony, five miles north of Leipzig, remarkable for three battles fought in its neighborhood. In the first, fought on the 17th of September (old style, 7th), 1631, Gustavus Adolphus inflicted a decisive defeat upon the imperialists under Tilly, who, as well as his generals, Pappenheim and Fürstenberg, was wounded. The second battle was also a victory of the Swedes under Torstenson, over the imperial forces under the Arch-duke Leopold and Piccolomini, Nov. 2d

(old style, Oct. 23d), 1642. The third battle was one act of the great "Battle of the Nations" at Leipzig, Oct. 16, 1813.

**BREMEN**, one of the Free Cities of the German Empire, located on both sides of the Weser. Area 99 sq. miles, population (in 1885) 166,392. For early history, map and constitution, see Britannica, Vol. III, pp. 255-56.

The constitution was proclaimed March 5, 1849, revised in 1854, 1875, 1878 and 1879. It is governed by a senate of 16 members, forming the executive, and a representative Convent of Burgesses ("Burgerschaft") of 150 members, returned by a vote of the citizens. The citizens who have studied at a university return 14 members; the merchants, 42 members; the mechanics and manufacturers, 22 members; and the other taxpaying inhabitants of the Free City the rest. The Convent and Senate elect the 16 members of the Senate, 10 of whom at least must be lawyers. Two burgomasters, the first elected for four years, and the second for the same period, direct the affairs of the Senate, through a ministry divided into twelve departments. All the ministers are senators.

Bremen, with Bremerhaven, is one of the chief outlets of German emigration. The following table shows the emigration statistics of the years 1886-88: 1886, 76,809; 1887, 99,476; 1888, 95,270. Public revenue in 1888, \$3,174,320; expenditure, \$3,214,680; imports, \$128,172,930; exports, \$123,765,815.

**BRENDAN**, **SAINT**, of Clonfert, an Irish abbot, born at Tralee in 484, died in 577. He studied under St. Jarlath of Tuam, and was ordained by Bishop Erc. His name is memorable chiefly for his voyages in search of "the mysterious land far from human ken." After seven years' fruitless wandering he returned, but once more, in a ship of wood instead of hides, set sail with sixty friends, and at length after many wanderings reached "that paradise amid the waves of the sea." Brendan founded a monastery at what is now Clonfert. His festival is on the 16th of May. *The Navigation of St. Brendan* was a very popular book in Western Europe as early as the 11th century; but the two voyages were compressed into one, and many other adventures added. In maps before Columbus's day, "St. Brendan's country" is placed to the south of the island of Antilia and west of the Cape Verde Islands.

**BRENIHAM**, a thriving town of Texas, county-seat of Washington county. It is situated in a fertile cotton and grain region, about a hundred miles east of Austin. It contains manufactories of iron, carriages, and lumber, and is an important center for the shipment of cotton.

**BRENTA**, a river of North Italy, issuing from a small lake in the Tyrol, and flowing 120 miles southward and eastward through the Venetian territory, till it falls into the Gulf of Venice at the haven of Brondolo. The old bed of the river was made use of as a canal, which forms the chief communication by water between Venice and Padua, while the Brenta is but little used for navigation.

**BRENTANO**, **LUJO**, political economist, born at Aschaffenburg, in Bavaria, Dec. 18, 1844. He studied at Dublin, and at four German Universities, and after attaining a post in the royal statistical seminary in Berlin went to England to study the condition of the working classes, especially trades associations and unions. The result of his observation was his work *On the History and Development of English Guilds* (London 1870); *Die Arbeitergilden der Gegenwart* (two volumes, Leipzig, 1871-72). He became professor of political economy at Breslau, and in 1882 at Strasburg. He has written works on wages (1877), labor in relation to land

(1877), and compulsory insurance for workmen (1881), on the English Chartists, on the 'Christian Socialist movement in England (2d edition Leipzig (1888), and numerous political pamphlets.

**BRENT-GOOSE**, or **BRENT BARNACLE** (*Bernicula brenta*), a species of wild goose, inhabiting most of the northern hemisphere. It is smaller than most geese, and has the head, neck, long wing-feathers, and tail black, the belly white, the rest slaty gray. It breeds in the far north, coming south in winter in great numbers. It lives on marine plants and small animals. There are twelve other species. See *Britannica*, Vol. X, p. 778.

**BRENTWOOD**, a market town in Essex, England, 10 miles southwest of Chelmsford by rail. It has a richly endowed grammar school, founded by Sir Anthony Browne, chief-justice of England, in 1567. There are remains of an old chapel, dedicated in 1221 to St. Thomas à Becket. Population, 4,653.

**BRENZ, JOHANN**, the Reformer of Württemberg, born at Weil, in Swabia, June 24, 1499, died at Stuttgart, Sept. 11, 1570. He went in his 13th year to study at Heidelberg, where in 1518 he became one of Luther's zealous adherents, and after his appointment as a preacher in the imperial free city of Hall, in Swabia (1522), he openly attached himself to the Reformation. He was at the Marburg Disputation in 1529, and the Diet of Augsburg in 1530, and in 1536 was summoned by Duke Ulrich to Württemberg to lead the Reformation there. For his opposition to the *interim* of Charles V he was forced to flee to Stuttgart, where in 1553 he became "propst" (or superintendent). Brenz was co-author of the Württemberg Confession of Faith, and his Catechism (1551) has held the next place to that of Luther in Protestant Germany.

**BRESSAY**, one of the Shetland Isles, separated from Lerwick by Bressay Sound. It is six miles long, one to three miles in breadth, and 10¼ square miles in area. Flag and roofing stones are quarried for exportation. Population 847, chiefly fishermen. Bressay Sound is one of the finest natural harbors in the world, and is a rendezvous for herring-boats, and for whalers and other vessels proceeding north.

**BRETIGNY**, a village in the French department of Eure-et-Loir, 20 miles south of Paris by rail. Here, in 1360, Edward III concluded a peace with France, by which John II of France was released from his captivity in England on agreeing to pay three million crowns for his ransom, while England renounced her claims to Normandy, Anjou, Maine, and Touraine, and was confirmed in possession of Gascony, Guienne, and several other parts of France, recently acquired by conquest.

**BRÉTON, JULES ADOLPHE**, born in 1827, and educated at St. Omer and at Douai. He received his instruction in art under Felix Devigne at Ghent, and in Drölling's atelier at Paris. The subjects of his earlier pictures are taken from the French Revolutionary period, but he soon turned to scenes from peasant life, which he had treated with an admirable union of style with realism. In 1853 he exhibited *Le Retour des Moissonneurs*, and in 1855 his celebrated *Les Glaneuses*. He is represented in the Luxembourg by *La Bénédiction des Blés* (1857); *Le Rappel des Glaneuses* (1859), and *Le Soir* (1861). Bréton is also known as a poet. His brother, Emile-Adélaïde is also a noted landscape painter.

**BRÉTON DE LOS HERREROS, DON MANUEL**, Spanish dramatist, born at Quel, in the province of Logroño, in 1796, died at Madrid, Nov. 13, 1873. He served as a volunteer in the army from 1814 to

1822, and subsequently held several government offices for short periods. His poems fill 5 volumes (Madrid 1850-52), and he brought out upwards of 150 plays, partly original, partly adaptations from the older Spanish classics, and partly translations from the Italian and French, most of which have been highly popular. See *Britannica*, Vol. XXII, p. 361.

**BRETSCHNEIDER, HEINRICH GOTTFRIEDSON, VON**, a satirist of unsettled life and eccentric habits, born at Gera, Germany, in 1739, died in 1810. From the Moravian Institute at Elbersdorf Bretschneider passed to the Gymnasium at Gera, and at seventeen entered the army. In 1778 he became librarian to the University of Ofen (Buda), and in 1782 Joseph II gave him a government appointment. Of his numerous works, including plays and poems, the chief are his satires, *Almanach der Heiligen auf* (1778) and *Wallers's Leben und Sitten* (1793).

**BRETEN**, a town of Baden, the birthplace of Melancthon, 16 miles northeast of Karlsruhe by rail. The house in which the Reformer was born belongs now to a foundation bearing his name for the support of poor students, established in 1861. A monument was erected in 1867. Population, 3,932.

**BRETT'S AND SCOTS, THE LAWS OF THE**: the name given in the 13th century to a code of laws in use among the Celtic tribes in Scotland. In the year 1305 an ordinance of Edward I of England, who appeared then to have reduced all Scotland to his subjection, decreed "that the usage of the Scots and the Bretts be abolished, and no more used." It is unknown how far this prohibition took effect. Of the code which it prescribed only a fragment has been preserved. It was printed by Sir John Skene, in his *Regiam Majestatem* (1609); and by Thomas Thomson and Cosmo Innes, in the *Acts of the Parliaments of Scotland*, volume I (1844), where the laws are given in three languages—Latin, French and English. The French version, which is the oldest, is printed from a manuscript of about 1270, formerly in the public library at Berne, in Switzerland, now in the Register House at Edinburgh. The fragment of the "laws of the Bretts and Scots" thus published is of much the same nature as the ancient laws of the Anglo-Saxons, the Welsh, the Irish, and other nations of Western Europe.

**BRETWALDA**, a title of supremacy among the early Anglo-Saxon kings, the exact signification and history of which are highly uncertain. The *Anglo-Saxon Chronicle* says of Egbert, "and he was the eighth king that was *Bretwalda*;" and the word only occurs elsewhere in an English and Latin charter of Athelstan in 934, in which that king is styled "King of the Anglo-Saxons and *Brytaenwalda* of all the island."

**BREVARD, EPHRAIM**, patriot, born about 1750, died in Charlotte, N. C., about 1783. He was a Princeton graduate, studied medicine and practiced in Charlotte. He was secretary of the noted Mecklenburg convention (May 31, 1775), at which he drew up a "declaration" which preceded the formal Declaration of Independence by a year. With six brothers Dr. Brevard entered the Continental service, but it was his misfortune to be captured and kept in prison till the ill he there suffered caused his death soon after he was liberated. He was a man of many accomplishments, and very influential in promoting the cause of Independence.

**BREVE**, a note in music. The name was originally applied to the shortest of the three notes used in early music, but in modern notation it is appropriated to the longest note used, having double the duration of a semi-breve. It occurs but



seldom except in church music, modern music being divided into bars, which usually fall short of it in length.

**BREVE**, or **BRIEVE**: in Scots law, a writ issuing from chancery, in the name of the crown, to a judge ordering him to try by jury the points or questions stated in the breve. In ancient times these writs appear to have been the foundation of almost all civil actions in Scotland; but latterly they have been much less used.

**BREVET**, in the British and American armies, a commission to an officer which promotes him to a higher rank irrespective of there being any vacancy in its established number. In the British army this promotion carries with it the higher rate of pay, but is neither purchasable nor salable. It has never been given to officers below the rank of captain, and is now only conferred for distinguished service. The holder retains his place and rank in his regiment if it is alone, but if acting with other troops he will take command of the whole force, provided that he is senior by brevet to the other officers. In the United States army, brevet rank extends from first-lieutenant to lieutenant-general; does not entitle the holder to the higher rate of pay, and gives no advanced command except by special assignment of the President. Brevets are conferred by and with the consent of the Senate for "gallant actions and meritorious services."

**BREVIPENNES** (Latin, "short-winged"), a name applied by Cuvier to the first family of *Grallæ*, comprising the ostrich, rhea, emu, etc., in which the wings are rudimentary, and not used in flight. The term is no longer in use.

**BREVOORT**, JAMES CARSON, born in New York city, July 10, 1818, died in Brooklyn, N. Y., Dec. 7, 1887. He was educated in France, returned to the United States, and in 1838 accompanied Washington Irving as secretary when he went as minister to Spain. He traveled much in Europe. He came to reside in Brooklyn, where he held several offices. He was made president of the Long Island Historical Society, regent of the University of New York, superintendent of the Astor Library for two years, and member of various historical, scientific, literary and geographical societies. He made valuable collections of books, manuscripts, medals, coins, and entomological and ichthyological specimens, which were given to public institutions where they would be preserved for reference.

**BREWER**, JOHN SHEEREN (1810-79), born at Norwich, England, in 1810; graduated with classical honors at Queen's College, Oxford, in 1833, took orders, and was appointed professor of English in King's College, London, in 1841. For nearly twenty years he labored in the Record Office editing the *Monumenta Franciscana* (1858); the *Opus Tertium* and *Opus Minus* of Roger Bacon (1859); volumes I-III of *The Works of Giraldus Cambrensis* (1861); the *Calendar of the Carew Papers* (1861), with the aid of Mr. Bullen; and volumes I-IV of the *Calendar of Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII* (1862-72). As an editor Brewer possessed patient industry and a rare sense of order, besides sound judgment and extensive knowledge. He was elected Honorary Fellow of Queen's College in 1870, and in 1877 was presented to the living of Toplefield, in Essex, where he died Feb. 16, 1879.

**BREWING STATISTICS**. For the general subject of brewing and for numerous statistics relating to various countries, See *Britannica*, Vol. IV, pp. 264-75. The following statistics showing the number of barrels of beer produced in the several States and Territories for the calendar years ending Dec. 31, 1889, and Dec. 31, 1890, were compiled by the

# United States Internal Revenue Bureau for the "Western Brewer":

|                     | 1889.      | 1890.      |
|---------------------|------------|------------|
| Alabama.....        | 27,447     | 38,558     |
| California.....     | 749,021    | 761,536    |
| Colorado.....       | 175,925    | 204,863    |
| Connecticut.....    | 286,643    | 314,512    |
| Georgia.....        | 27,815     | 46,800     |
| Illinois.....       | 2,129,978  | 2,504,807  |
| Indiana.....        | 488,208    | 557,469    |
| Iowa.....           | 89,141     | 102,173    |
| Kansas.....         | 4,440      | 2,110      |
| Kentucky.....       | 301,931    | 348,396    |
| Louisiana.....      | 172,552    | 218,375    |
| Maryland.....       | 676,907    | 703,836    |
| Massachusetts.....  | 971,255    | 968,042    |
| Michigan.....       | 533,222    | 586,723    |
| Minnesota.....      | 418,238    | 356,116    |
| Missouri.....       | 1,751,928  | 2,034,761  |
| Montana.....        | 70,192     | 81,917     |
| Nebraska.....       | 164,141    | 164,343    |
| New Hampshire.....  | 374,462    | 370,346    |
| New Jersey.....     | 1,453,173  | 1,586,266  |
| New Mexico.....     | 5,452      | 7,520      |
| New York.....       | 8,333,407  | 8,910,674  |
| Ohio.....           | 2,232,057  | 2,568,841  |
| Oregon.....         | 140,054    | 202,926    |
| Pennsylvania.....   | 2,533,864  | 3,016,557  |
| South Carolina..... | 9,830      | 8,880      |
| Tennessee.....      | 57,048     | 80,134     |
| Texas.....          | 61,283     | 82,086     |
| Virginia.....       | 48,070     | 56,280     |
| West Virginia.....  | 112,766    | 128,978    |
| Wisconsin.....      | 1,909,898  | 2,313,201  |
| Total barrels.....  | 26,211,320 | 29,328,536 |

The net increase for 1890 over 1889 is 3,117,216 barrels. The list of States is given as constituted for purposes of collection by the Internal Revenue Bureau in 1887. California's return includes Nevada; Colorado includes Wyoming; Connecticut includes Rhode Island; Louisiana includes Mississippi; Maryland includes Delaware; the District of Columbia, and two counties of Virginia; Montana includes Idaho and Utah; Nebraska includes the Dakotas; New Hampshire includes Maine and Vermont; New Mexico includes Arizona; Oregon includes Washington and Alaska.

The monthly sales for 1890 range from the lowest, 1,632,571 barrels in January, to the highest, 3,304,895 barrels in July.

**BREWSTER**, BENJAMIN HARRIS, jurist, born in Salem county, N. J., Oct. 13, 1816, died in Philadelphia, Pa., April 4, 1888. He was a graduate of Princeton in 1834, and was admitted to the Philadelphia bar in 1838; was Indian commissioner in 1846, attorney-general of Pennsylvania in 1867-69, and of the United States under President Arthur, 1881-85. He prosecuted the famous Star Route trials.

**BREWSTER**, JAMES, born in Preston, Conn., Aug. 6, 1788, died in New Haven, Nov. 22, 1866. He was a descendant of Elder Brewster. Thrown on his own resources at an early age he learned the trade of carriage building, and eventually employed a large force of men, in whose welfare he took a philanthropic interest. He was president of the New Haven and Hartford Railroad Company, giving up his business for four years that he might attend to the building of the road (1834-38), and assuming large financial responsibility in its interest.

**BREWSTER**, WILLIAM, pilgrim in the *Mayflower*, born in Nottingham county, England, about 1560, died in Plymouth, Mass., April 10, 1644. Authorities differ as to the exact dates. He was of good family, and after studying at Cambridge entered the service of William Davison, ambassador, and afterwards secretary of state to Queen Elizabeth, with whom he visited the Netherlands. Subsequently returning to Scrooby, he held the honorable and important office of postmaster. He had become a "Separatist" and as this sect was the object of persecution he made two attempts to emigrate to Amsterdam. The first effort ended in arrest and imprisonment, as the skipper of the vessel betrayed him and his companions; the second attempt was successful. He was obliged to teach English on

arriving at Amsterdam in order to support himself. Here he set up a printing press and published religious books, which were prohibited in England. Sir Edward Sandys, treasurer of the Virginia Company, secured for him a grant of land in North America; and Elder Brewster, with a company of one hundred pilgrims, set sail in the *Mayflower* and landed where Plymouth, Mass., is now located, Dec. 21, 1620. Brewster was made ruling elder of the church and teacher in the colony. All the hardships were patiently borne by him. He left four sons and a daughter, and their descendants are among the highly esteemed families of New England.

**BRIANCHON**, CHARLES JULIEN, French mathematician, born at Sèvres in 1785, died in 1865. He contributed some important papers to French mathematical journals; but is best known by a theorem (see *Britannica*, Vol. X, p. 397), the correlative of Pascal's, which he published in 1806.

**BRIARE**, a town in the French department of Loiret, on the Loire, 102 miles southeast of Paris by rail. The Canal-de-Briare (35 miles long), which unites the Loire and the Seine, was the first constructed in France (1642). Population, 5,034.

**BRIAR-ROOT**, a fine hard wood obtained from the roots of a species of very large heath (*Erica arborea*), which grows in the Pyrenees, in Corsica, and in Algeria. The name is a corruption of the French *bruyère* ("heath"), and has nothing to do with *briar*. See *Britannica*, Vol. XIX, p. 112.

**BRIBERY**. See *Britannica*, Vol. IV, pp. 278-89. The Constitution of the United States numbers bribery among the crimes for which the President and other civil officers may be impeached. In the several States the definition and punishment of bribery are generally fixed by statute.

**BRICE**, SAINT, Bishop of Tours, commemorated as a confessor in the beginning of the fifth century. *St. Brice's Day*, in 1002 (in the reign of Ethelred II.), is notorious in old English history for a great massacre of the Danes. It was believed that it was a concerted attempt to exterminate all the

Danes in England; but, failing of its bloody purpose, it led to reprisals by the Danish king Sweyn.

**BRICK**. See *Britannica*, Vol. IV, pp. 279-284.

**BRIDEWELL**, a well between Fleet Street and the Thames, London, dedicated to St. Bride, which has given its name to a palace, parish, house of correction, hospital and an industrial school.

**BRIDGEPORT**, a city and seaport, one of the capitals of Fairfield county, Conn., situated on Long Island Sound, 58 miles northeast of New York, on the New York, New Haven & Hartford Railroad, at the southern terminus of the Housatonic and Naugatuck Railroads. It has a safe harbor, which is accessible for small vessels at all seasons of the year, and has a regular passenger steamboat service to New York. Bridgeport is distinguished for its manufactories of sewing machines, metallic cartridges, carpets, malleable iron, copper, cold-rolled steel-plates, steam engines, etc. The streets are well paved, handsomely shaded and lighted with gas and electricity. Horse-cars traverse all parts of the city. It has an efficient police force and fire department and an abundant water supply. A new court-house and a United States building for post-office and custom-house have recently been completed. It has a city high school, systems of public schools, several private schools, a public library of 18,000 volumes, and a number of charitable institutions. The city has four handsome parks. Population in 1870, 18,969; in 1880, 27,643; in 1890, 43,556. See *Britannica*, Vol. IV, p. 284.

**BRIDGEPORT**, a village of Ohio, is situated on the Ohio River, opposite Wheeling. It contains important manufactories of iron, glass, stoves, machinery, barrels and lumber. In the vicinity are extensive coal mines.

**BRIDGEPORT**, a beautiful town of Pennsylvania, situated on the Schuylkill River, opposite Norristown. It contains manufactories of paper, woollens and iron, and in the neighborhood are numerous lime-kilns.

**BRIDGES**. For an elaborate illustrated article on bridges, with an extended discussion of the tensile strength of materials, architectural finish, and practical construction of various kinds of bridges, see *Britannica*, Vol. IV, pp. 284-341. The following is an alphabetical list of the principal bridges throughout the world, with descriptive notes of those which are most recent:

**Agem**—Stone; length, 352 feet; arch, segment.  
**Albany**—(over the Hudson)—Stone; length, 1,740 feet.  
**Alcantara**—Stone; length, 612 feet; semi-circular arch.  
**Alme**—Stone; length, 452 feet; elliptical arch.  
**Almaraz**—Stone; length, 530 feet; semi-circular arch.  
**Arthur Kill**—Staten Island, N. Y. See descriptive notes below.  
**Arcueil Aqueduct**—Stone; length, 1,279 feet; semi-circular arch.  
**Ariela Viaduct**—Stone; length, 885 feet; semi-circular arch.  
**Athlone**—Wrought iron; length, 534 feet; truss.  
**Avignon**—Length, 1,710 feet.  
**Avon Viaduct**—Stone; length, 725 feet; elliptical arch.  
**Badajoz**—Length, 1,874 feet.  
**Ballochmyle Viaduct**—Stone; length, 645 feet; semi-circular arch.  
**Barentin Viaduct**—Stone; length, 1,545 feet; semi-circular arch.  
**Barnes**—Cast iron; length, 380 feet; arch, segment.  
**Bassano**—Timber; length, 209 feet; truss.  
**Beaune Viaduct**—Stone; length, 911 feet; semi-circular arch.  
**Belfast**—Length, 2,500 feet.  
**Belloucur**—Stone; length, 417 feet; elliptical arch.  
**Bergehette**—Stone; length, 280 feet; semi-circular arch.  
**Berne**—Stone; length, 405 feet; arch, segment.  
**Bewdley**—Stone; length, 187 feet; arch, segment.  
**Bideford**—Stone; length, 720 feet; ogival.  
**Bietighelm Viaduct**—Stone; length, 936 feet; semi-circular arch.  
**Birkwood Burn**—Stone; length, 98 feet; semi-circular arch.  
**Biscari Aqueduct**—Stone, length, 1,222 feet; ogival.

**Bismarck** (over Missouri River).—See notes below.  
**Blackfriars**—Stone; length, 995 feet; elliptical arch.  
**Bombay**—(Madras); length, 3,730 feet.  
**Boston**—Length, 3,433 feet.  
**Bourbon**—Wrought iron; length, 250 feet; suspended.  
**Boyne**—Wrought iron; length, 1,760 feet; lattice; cost, \$700,000.  
**Brighton Viaduct**—Brick; length, 960 feet; semi-circular arch.  
**Bristol**—Stone; length, 135 feet; ogival.  
**Britannia**—Wrought iron; length, 1,488 feet; tubular; cost, \$3,009,325.  
**Brooklyn**—(East River). See notes below.  
**Cabriel**—Stone; length, 304 feet; semi-circular arch.  
**Carpetras Aqueduct**—Stone; length, 2,558 feet; semi-circular arch.  
**Caserta Aqueduct**—Stone; length, 1,687 feet; semi-circular arch.  
**Chalons**—Stone; length, 323 feet; semi-circular arch.  
**Chaumont Viaduct**—Length, 1,968 feet; semi-circular arch.  
**Chavannes**—Stone; length, 420 feet; elliptical arch.  
**Chelsea**—Length, 700 feet; suspension.  
**Chepstow**—Cast and wrought iron; length, 628 feet; tubular.  
**Chirk Aqueduct**—Stone; length, 710 feet; semi-circular arch.  
**Cincinnati and Covington**—(over the Ohio); built 1867; length, 1,067 feet; suspension. See notes below.  
**Civita Castellani Aqueduct**—Stone; length, 820 feet.  
**Clifton**—(over Niagara River); length, 1,268 feet; suspension. See notes below.  
**Coldstream**—Stone; length, 355 feet; arch, segment.  
**Cologne** (over the Rhine).—Iron, length, 1,532 feet; arch.  
**Congleton Viaduct**—Stone; length, 2,870 feet; arch; segment.  
**Crumlin Viaduct**—Iron; length, 1,050 feet; truss-gird; cost, \$195,000.  
**Curliant Crags**—Stone; length, 180 feet; semi-circular arch.  
**Danube** (near Stadlan, Austria)—Iron; length, 2,520 feet.  
**De la Ture Viaduct**—Stone; length, 888 feet; semi-circular arch.  
**Dean**—Stone; length, 450 feet; arch, segment.  
**Dee Viaduct** (Delaware River, Pa.)—Stone; length, 1,388 feet; semi-circular arch.  
**Della Trinita**—Stone; length, 350 feet; elliptical arch.  
**Dinan Viaduct**—Stone; length, 635 feet; semi-circular arch.  
**Dinting Vale Viaduct**—Timber; length, 1,452 feet; arch, segment.



**Dolhain Viaduct**—Stone; length, 786 feet; semi-circular arch.  
**Douro (Portugal)**—Iron; length, 115 feet; arch.  
**Dubique (over the Mississippi)**—Iron; length, 1,758 feet.  
**Dunkeld**—Stone; length, 470 feet; arch segment.  
**Eauplet**—Timber; length, 1,148; segment ribs.  
**Elstherthal Viaduct**—Stone; length, 892 feet; elliptical arch.  
**Emilius**—Stone; length, 550 feet; semi-circular arch.  
**Florence (over the Arno)**—Built 1569; marble; length, 323 feet; elliptical arch.  
**Forth**—Scotland. See notes below.  
**Franzsdorf Viaduct**—Stone; length, 1,916 feet; semi-circular arch.  
**Fribourg (built 1832)**—Wire rope; length, 870 feet; suspension; cost, \$125,000.  
**Gignac**—Stone; length, 412 feet; elliptical arch.  
**Glasgow**—Stone; length, 406 feet; arch, segment.  
**Grovebury Irrigation Aqueduct**—Stone; length, 2,356 feet; arch segment.  
**Großschultha Viaduct**—Stone; length, 1,900 feet; elliptical arch.  
**Guetia**—Stone; length, 1,476 feet; semi-circular arch.  
**Harlem River Aqueduct**—Stone; length, 1,450 feet; semi-circular arch.  
**Hawksbury (New South Wales)**—Iron and steel; length, 2,900 feet; cost, \$350,000; opened May 1, 1880.  
**Hexham**—Stone; length, 524 feet; arch, segment.  
**Hungerford**—Length, 1,350 feet; suspension.  
**Indre Viaduct**—Stone; length, 2,403 feet; semi-circular arch.  
**Invalides (1)**—Length, 480 feet; suspension.  
**Invalides (2)**—Length, 412 feet; suspension.  
**Invalides (3)**—Stone; length, 468 feet; arch, segment.  
**Jena**—Stone; length, 546 feet; arch, segment.  
**Kelco**—Stone; length, 410 feet; elliptical arch.  
**Kentucky River**—Iron; length, 1,138 feet; cantilever; opened April 20, 1877. See notes below.  
**Kieff**—Length, 2,562 feet; suspension.  
**Landore Viaduct**—Timber; length, 1,760 feet; truss; cost, \$113,600.  
**Langon**—Wrought iron; length, 678 feet; girder.  
**Laubert**—Stone; length, 432 feet; arch, segment.  
**Libourne**—Stone; length, 690 feet; elliptical arch.  
**Limerick**—Stone; length, 412 feet; elliptical arch.  
**Lisbon Aqueduct**—Stone; length, 3,605 feet; ogival.  
**Lockwood Viaduct**—Stone; length, 1,428 feet; semi-circular arch.  
**Loeban Viaduct**—Stone; length, 624 feet; semi-circular arch.  
**London (Thames)**—Stone; length, 1,005 feet; elliptical arch; cost, \$1,458,311; opened, 1831.  
**Louisville, Ky. (over the Ohio)**—Length, 5,310 feet. See notes below.  
**Lune Aqueduct**—Stone; length, 420 feet; semi-circular arch.  
**Maintenen Aqueduct**—Stone; length, 16,367 feet; semi-circular arch.  
**Malannay Viaduct**—Stone; length, 500 feet; semi-circular arch.  
**Mayence (over the Rhine)**—Length, 3,380; arch, segment.  
**Menal (built 1819-25)**—Length, 1,050 feet; suspension.  
**Mersey**—Stone; length, 447 feet; semi-circular arch.  
**Mont Louis**—Stone; length, 1,257 feet; elliptical arch.  
**Montpellier Aqueduct**—Stone; length, 3,214; semi-circular arch.  
**Muhlthorf**—Timber; length, 370 feet; truss.  
**Nabresina**—Stone; length, 2,115 feet; semi-circular arch.  
**Namur**—Stone; length, 450 feet; arch, segment.  
**Navilly**—Stone; length, 466 feet; elliptical arch.  
**Neuilly (built 1774)**—Stone; length, 865 feet; elliptical arch.  
**Nevers**—Cast iron; length, 1,066 feet; arch, segment.  
**New Westminster**—Cast and wrought iron; length, 900 feet; elliptical arch.  
**Newcastle High Level**—Cast iron; length, 820 feet.  
**Niagara (built 1855)**—Length, 2,220 feet; suspension; cost, \$400,000.  
**Niagara (1883)**—Iron and steel; length between anchorages and piers, 9,10 feet; cantilever. See notes below.  
**Nogent-sur-Marne Viaduct**—Stone; length, 2,722 feet; semi-circular arch.  
**Old London**—Stone; length, 926 feet; arch, segment.  
**Omaha (over the Missouri)**—Length, 2,800 feet. See notes below.  
**Orb Canal Aqueduct**—Stone; length, 648 feet; elliptical arch.  
**Orense**—Stone; length, 1,300 feet; ogival.  
**Orleans**—Stone; length, 1,110 feet; elliptical arch.  
**Ouse Burn Dean Viaduct**—Timber; length, 630 feet; arch, segment.  
**Ouse Valley Viaduct**—Brick; length, 1,290 feet; semi-circular arch.  
**Parkersburg Bridge, W. Va.**—Iron; length, 7,045 feet.  
**Pavia**—Stone; length, 620 feet; ogival.  
**Peacock**—Timber; length, 660 feet; lattice.  
**Perth**—Stone; length, 606 feet; arch, segment.  
**Pesth (built 1840-49)**—Length, 1,262 feet; suspension.  
**Po (near Mezzano-Cort, Italy)**—Length, 3,485 feet.  
**Potomac**—Length, 5,800 feet.  
**Pont de la Concorde**—Stone; length, 490 feet; arch, segment.  
**Pont Neuf**—Stone; length, 996 feet.  
**Pont du Gard Aqueduct**—Stone; length, 879 feet; semi-circular arch.  
**Pont y Cys Sylte Aqueduct**—Cast iron; length, 1,007 feet; arch segment.  
**Ponte dell' Arcate Aqueduct**—Stone; length, 660 feet; semi-circular arch.

**Ponte Corvo**—Stone; length, 640 feet; semi-circular arch.  
**Portage Viaduct**—Timber; length, 876 feet.  
**Poughkeepsie**—Iron and steel; length, 6,767 feet; cantilever; opened, Feb. 1, 1889. See notes below.  
**Prairrie du Chien (over Mississippi)**—Length, 7,000 feet; drawbridge. See notes below.  
**Prague**—Stone; length, 820 feet.  
**Pyrgos Aqueduct**—Stone; length, 723 feet; semi-circular arch.  
**Quincy (over Mississippi)**—Iron; length, 3,200 feet. See notes below.  
**Radsabon**—Stone; length, 994 feet; semi-circular arch.  
**Riga**—Stone; length, 2,000 feet; semi-circular arch.  
**Roanne**—Stone; length, 632 feet; elliptical arch.  
**Rochester (new)**—Cast iron; length, 498 feet; arch, segment.  
**Rochester (old)**—Stone; length, 500 feet; arch, segment.  
**Royal Border Bridge (Berwick)**—Stone; length, 2,160 feet; semi-circular arch.  
**Ribble**—Stone; length, 675 feet; elliptical arch.  
**Roman Aqueduct (near Lyons)**—Stone; length, 765 feet; semi-circular arch.  
**Saltask**—Wrought iron; length, 2,195 feet; girder.  
**Saumur**—Stone; length, 920 feet; elliptical arch.  
**Schaffhausen**—Timber; length, 876 feet; frame truss.  
**Schildesche Viaduct**—Stone; length, 1,250 feet; semi-circular arch.  
**Schuyllkill**—Timber; total length, 1,000 feet; frame truss. See notes below.  
**Schuyllkill**—Cast iron; length, 1,000 feet; arch. See notes below.  
**Sitterbrücke**—Iron; length, 385 feet; lattice.  
**Solani Aqueduct**—Stone; length, 1,050 feet; arch, segment.  
**Southwark**—Cast iron; length, 710 feet; arch, segment.  
**Spoletto**—Stone; length, 876 feet; ogival.  
**St. Angelo**—Stone; length, 520 feet; semi-circular arch.  
**St. Anne's**—Wrought iron; length, 1,350 feet; tubular.  
**St. Charles (Mo.)**—Iron; length, 6,536 feet.  
**St. Esprit**—Stone; length, 2,690 feet; arch, segment.  
**St. Germain Viaduct**—Stone; length, 820 feet; semi-circular arch.  
**St. Louis (over the Mississippi)**—Iron; length, 1,509 feet; arch.  
**St. Petersburg**—Cast iron; length, 1,090 feet; arch, segment.  
**Staines**—Stone; length, 410 feet; arch, segment.  
**Stockport**—Stone; length, 1,792 feet; semi-circular arch.  
**Strasbourg**—Stone; length, 3,390 feet; semi-circular arch.  
**Sukkur**—(over Indus)—Iron; length of main span, 820 feet; cantilever.  
**Susquehanna**—Stone; length, 3,500 feet; semi-circular arch. See notes below.  
**Tarascon**—Cast iron; length, 1,575 feet; arch, segment.  
**Tarragona (Roman Aqueduct)**—Stone; length, 895 feet; semi-circular arch.  
**Tay (at Dundee)**—Iron; length, 10,612 feet; viaduct; cost, \$350,000; opened May 22, 1887.  
**Toulouse**—Stone; length, 1,422 feet; elliptical arch.  
**Tower (over Thames)**—Iron; length, 2,640 feet; suspension; to be opened, 1898. See notes below.  
**Tyne Viaduct**—Stone; length, 902 feet; semi-circular arch.  
**Union (Tweed) Viaduct**—Length, 885 feet; suspension.  
**Val Benoit**—Stone; length, 366 feet; arch, segment.  
**Val Fleury Viaduct**—Stone; length, 468 feet; semi-circular arch.  
**Vauxhall**—Cast iron; length, 798 feet; arch, segment.  
**Verona (Coccaglio)**—Stone; length, 1,323 feet; ogival.  
**Victoria (St. Lawrence)**—Wrought iron; length, 9,457 feet; tubular.  
**Vistula River (near Dirschau, Germany)**—Iron; length, 2,750 feet.  
**Washington (over Harlem River, New York city)**—Iron and Steel; length, 2,380 feet; arch; opened May 1, 1889. See notes below.  
**Waterloo (London, built 1811-17)**—Stone; length, 1,380 feet; elliptical arch.  
**Westminster (London, built 1750)**—Stone; length, 1,220 feet; semi-circular arch.

**NOTES ON THE FOREGOING LIST.**—With the exception of the Tower Bridge and Forth Bridge, those described in the following notes are all American, a number of them having been constructed during the past decade. They are placed in alphabetical order for the purpose of convenient reference:

*The Albany Bridge*, 1,740 feet in length, was built over the Hudson River at Albany to connect the New York Central Railroad with the Harlem, Boston and Albany roads. It has altogether 15 spans, and a swing bridge 274 feet long. *The Arthur Kill*, a drawbridge, was authorized by act of Congress of June 16, 1886, and on June 13, 1888, was pronounced in working order. The Kill is a tidal river separating Staten Island, N. Y., from New Jersey. The length of the bridge, not including approaches, is 800 feet. The two shore spans are each 150 feet in length, and are covered by fixed trusses and two draw spans each 206 and 204 feet in the clear. The total length of the draw-bridge is 500 feet, and it can be opened or closed in about two minutes. The total cost of the bridge was \$450,000.

The *Bismarck Bridge* over the Missouri River, between Bismarck and Mandan, North Dakota, forms an integral part of the Northern Pacific Railroad. The construction of the bridge, which was begun in April, 1881, involved the control and regulation of the river. This consisted in confining the river to the limit of 1,000 feet between the east shore and the end of the dike, and the protection of the east shore with riprap, so as to render it doubly secure from the eroding action of the water. There were used in the construction of the dike 30,000 tons of granite boulders for riprap, besides a large quantity of brush and crib logs, and used 25,000 cubic yards of clay. The bridge proper consists of three through spans, each measuring 400 feet between centers of end piers, and two approach spans, each 113 feet. The east end of the east approach span is supported by a small abutment of granite masonry founded on the natural ground of the bluff. The west end of the west approach span is supported by an iron bent resting on two cushion cylinders, which are supported by piles driven into the sand bar. The three long spans are supported by four granite piers, containing each 600,950 pounds of wrought iron, 348,797 pounds of steel, and 25,779 pounds of cast iron. The bridge was completed Oct. 7, 1882. George S. Morrison was the engineer during construction.

The *Brooklyn Bridge*, or East River Suspension Bridge, which connects the city of Brooklyn with New York city, was formally opened on May 24, 1883. The designs were completed by the late John A. Roebling at least ten years before the work of construction was begun, which occurred Jan. 2, 1870. The caisson for the Brooklyn tower was sunk in 1871, and the caisson for the New York tower was laid the year following. These caissons were sunk by the pneumatic process, and the compressed air caused many cases of caisson-disease. The Brooklyn tower, which contains 33,214 cubic yards of masonry, was completed in May, 1875, and the New York tower, containing 46,945 cubic yards of masonry, was finished in July, 1876. The first wire was run out May 23, 1870. The cable-making commenced June 11, 1877. Each cable contains 5,296 parallel galvanized steel oil-coated wires, closely wrapped in a solid cylinder 15½ inches in diameter. The total height of towers above the high-water line is 378 feet. The clear height of bridge in center of river span above high water is 135 feet. The depth of foundation below high-water mark is 45 feet for Brooklyn tower, and 78 feet for New York tower. The length of each land span is 490 feet and 1,860 feet, respectively; length of Brooklyn approach, 971 feet; length of New York approach, 1,502 feet; making the total length of the bridge 5,993 feet. The length of the suspended structure from anchorage to anchorage is 3,454 feet; and its total weight is 6,470 tons. The termini of the bridge are respectively opposite the City Hall, New York, and at the junction of Sands and Fulton streets, Brooklyn. The bridge has a width of 85 feet. The roadway is divided into a central promenade with a single track on either side for rapid transit, and a platform for passengers, which is in turn flanked by a tramway for wheeled vehicles. The actual cost of the bridge was nearly \$15,000,000. Engineer Roebling died June 22, 1889, when his son, Washington A. Roebling, was placed in charge of the work. The latter was prostrated early in 1872 by a peculiar form of caisson disease, which compelled him for awhile to give up active work, but his intellectual faculties remained unimpaired. O. C. Martin was principal assistant engineer, and has held the position of superintendent and principal engineer since the completion of the bridge.

The *Clifton Bridge*, though of less importance than the Niagara bridge proper, is quite remarkable from its peculiar construction. The end resting on the left bank is three-quarters of a mile below the Great Horse Shoe Fall on the Canada side of the Niagara River. The end of the bridge resting on the right bank is 300 yards below the American Fall. The span between the centers of towers is 1,268 feet 4 inches. The elevation is 193 feet above the water on the Canada side, and 183 feet on the American side, and the elevation of the center is from 190 to 193 feet according to the season. The total length of each cable is 1,888 feet. The length of the bridge from rock to rock is 1,190 feet.

The *Cincinnati and Covington Bridge*, erected over the Ohio River by the noted engineer John A. Roebling, was completed in 1867. The main span, from center of tower to tower, is 466 feet, and the total length between abutments is 1,619 feet. The elevation of floor above low water at center is 103 feet. The length of the Cincinnati approach from Front street to the abutment is 341 feet. The total length of the bridge including approaches is 2,252 feet. There are two cables each 12½ inches in diameter.

The *Firth of Forth Bridge*. In 1882 an act of Parliament was obtained for the construction of a cantilever bridge over the river Forth at Queen's Ferry, Scotland, which was begun in 1883, and formally opened on March 4, 1890. The bridge consists of two approach viaducts and of the cantilever bridge proper. The length of the cantilever bridge is 5,330 feet, consisting of the central tower on Inchgarrie, 260 feet; the Fife and Queen's Ferry central towers, 162 feet each; the two central connecting girders, 350 feet each; and six cantilevers of 680 feet each. The cantilever end piers are apart 5,349 feet 6 inches from center to center. The south approach viaduct is 1,978 feet long from center of cantilever end pier to end of arches, consisting of ten spans of 168 feet each, four arches of 66 feet each, center to center, and a 24 feet center span. The north approach viaduct is 988 feet 8½ inches long from end of arches, consisting of five spans of 168 feet each in length, three arches of 87 feet, 51 feet, and 45 feet, center to

center, respectively, and 14 feet 3¼ inches made up by abutments. The total length of the structure is therefore 8,265 feet 9 inches. The two main strands are 1,710 feet from center to center of vertical columns, made up of two cantilevers of 680 feet each, and one central girder 350 feet. The cost of the bridge was \$1,600,000 and over 50,000 tons of steel were used in the construction.

The *Kentucky River Bridge*, erected on the line of the Cincinnati Southern Railway, has a length between abutments of 1,138 feet. The erection was commenced Oct. 16, 1876. The bridge was completed Feb. 20, 1877, and the official test was made April 20 of the same year. The engineer who designed the bridge and carried out the work of construction is C. Shaler Smith. The iron work is of superior quality.

The *Louisville Bridge*, which crosses the Ohio River at Louisville, is one of the largest iron bridges in America. It has 27 spans, and a total length of 5,310 feet.

The *Niagara Cantilever Bridge*, over the Niagara River, about two miles below the falls, and 300 feet above the railroad suspension bridge, spans a chasm of 850 feet in width, and 210 feet in depth to the surface of the water. The river is 425 feet wide at the bridge site. The banks slope at about 45 degrees from the water's edge to about 50 feet below the top of the cliff, above which they are perpendicular. The structure carries a double track. It consists of two cantilevers resting on the towers, the shore end being anchored to the anchorage piers, and the river ends connected by an intermediate span. The distance between centers of anchorage piers is 910 feet 1½ inches; length of each cantilever, 385 feet; length of intermediate span, 120 feet. Each cantilever consists of a shore arm 195 feet long, one panel 25 feet over the tower, and a river arm of 175 feet in length. C. C. Schneider was appointed chief engineer April 26, 1883. The work was vigorously pushed, and the bridge was completed and opened for traffic Dec. 20, 1883.

The *Omaha Bridge*, which crosses the Missouri River at Omaha, has 11 spans of 250 feet each. The total length is 2,800 feet.

The *Poughkeepsie Bridge*, across the Hudson River at Poughkeepsie, was originally promoted by the Pennsylvania Railroad Company in 1873, but after the foundation stone of the eastern shore pier had been laid the project was abandoned. In 1876 the scheme was revived, and the actual work of building began, but was suspended in 1878 and not resumed until 1886. By this time a cantilever design had been decided on, and the 530 feet center to center of end piers necessary to reach these bluffs was made common for all three cantilever spans. The clear span, with the half width of the towers added, made the spans next the shores 548 feet, and the center span 546 feet, which, with the connecting ones of 525 feet, center to center of piers, located pier 6 in the face of the rock on the east shore. The total length between anchorages was thus established at 3,093 feet 9 inches; the total length, including viaducts, 6,767 feet 3 inches. The general design of the river piers is a crib and grillage, extending from the gravel to 10 feet below high water. On this is the masonry to 40 feet above high water, upon which is a steel tower 100 feet high to pedestals of trusses. The towers at the end of the spans were first erected; next commencing at the fixed end the bottom chord was laid along in place on camber blocks; then commencing from the middle the traveler erected the span. From the shore arms and connecting spans, cantilevers of 160 feet were erected by the process of projecting travelers, composed of two trusses 118 feet long, with chords and vertical posts of wood and iron ties and splice-plates. The bridge was opened for traffic on Feb. 1, 1889; it reduces the distance between the anthracite fields of Pennsylvania and points east of the Hudson from 116 to 35 miles.

The *Prairie du Chien, Pontoon Railroad Bridge*, was built in 1874 across the Mississippi River between Prairie du Chien, in Wisconsin, and North McGregor, in Iowa, for the purpose of connecting the divisions of the Chicago, Milwaukee & St. Paul Railway Co., terminating, respectively, at the points named. The river here is divided by an interjacent island into two channels, both of which are navigated. The McGregor channel is 1,500 feet wide, while the width of the Wisconsin and Iowa shores, embracing the island, is 7,000 feet, which corresponds to the length of the bridge. Each of the draws is a single float 30 feet wide at the bottom, 6 feet deep, 41 feet on deck, and 408 feet in length. Each draw contains about 600,000 feet of plank and timber.

The *Quincy Iron Bridge*, which crosses the Mississippi at a point where the width of the river is 3,200 feet, has 17 spans, and was designed and constructed under Thomas C. Clarke at a cost of over \$1,000,000.

The *Schuylkill Arch-truss Bridge*, constructed by Lewis Wernwag in 1812, at Philadelphia, was familiarly known as the "Colossus of Fairmount," having a single span of 340 feet 8½ inches. In consideration of the length of span (longer than any which had yet been erected), its solidity and its strength, it was regarded by its visitors as a veritable "wonder of the world." This was Wernwag's third bridge. From that date until 1834 he built 29 additional bridges, one of them being the famous "Economy" bridge erected over Neshaminy Creek, Pa., and specially noted for its simplicity and inexpensiveness of construction. Its type was much like that of the cantilever bridges prevalent at later dates.

The "Colossus" bridge was destroyed by fire in 1889, and was succeeded by the first wire suspension bridge in this country. It was planned and erected by Charles Ellet,



who, later, designed and built (in 1847) the railway bridge across the Niagara River below the Falls, and who, still later, built a suspension bridge at Wheeling, W. Va. See biographical sketches of ELLET and WERNWAG, in these Revisions and Additions.

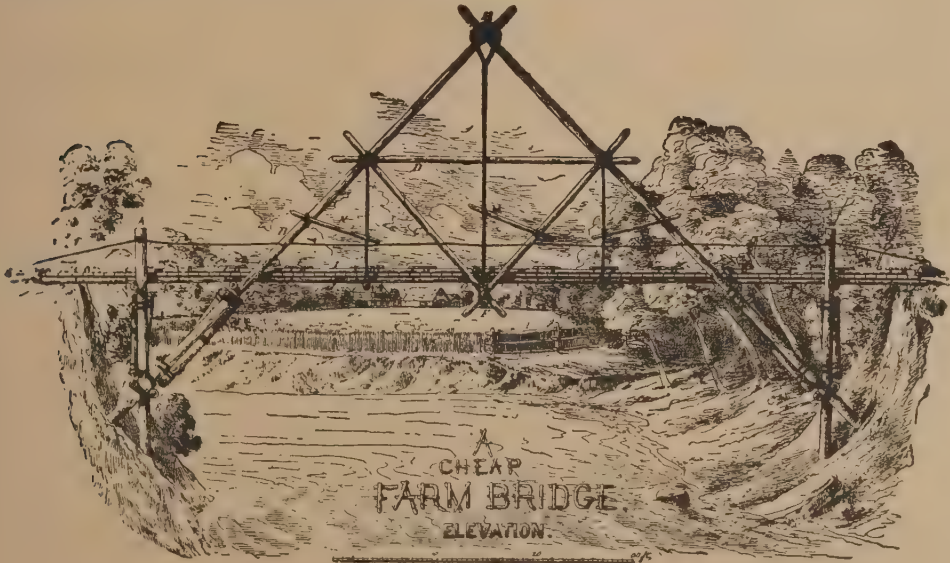
*The Schuylkill Cast-iron Arched Bridge*, erected at Chestnut street, Philadelphia, Pa., over the Schuylkill River, was finished in 1866. It has two main spans of 185 feet. The total length is 1,000 feet. The cost of construction was \$500,000.

*The Susquehanna Bridge*, which crosses the Susquehanna River, is located on the Pennsylvania Railroad,  $5\frac{1}{2}$  miles north of Harrisburg, Pa. It is supported on 22 piers and two abutments. The total length of the bridge is 3,500 feet.

*The Tower Bridge*, now in course of construction across the Thames River, London, has a total length of 2,640 feet, including the necessary approaches on both sides. The distance between the abutments on the two sides of the river is 880 feet. The two massive piers of masonry, each 10 feet wide, have been built in the bed of the river, leaving a central opening 200 feet wide above high water, and two side openings, each 270 feet wide, the area of waterway being 20,040 square feet. Along the approaches and across the side spans the roadway will be 60 feet wide, but across the central span the width will be reduced to 30 feet. The headroom under the bridge will be 29½ feet, and this will be sufficient for most of the river traffic. To allow the passage of vessels of greater height, the central span will be made in the form of two leaves nicely balanced, so that they may be easily raised to bring the roadway into a vertical position, hydraulic machinery being used for that purpose. The raising of these leaves will, of course, interrupt the traffic of vehicles, but foot passengers will be able to cross at all times by two permanent high level gangways. The quantities of materials in building this bridge are estimated at 250,000 cubic feet of stone, and 70,500 cubic feet of concrete for the piers and ap-

proaches, while 15,000 tons of iron and steel will be used in the bridge proper. The end of 1892 is the limit given to the contractors to complete all the work, so that the bridge will probably be opened in 1893.

*The Washington Bridge*, built over the Harlem River at 181st St., New York city, derives its name partly from its contiguity to Washington Heights and Fort Washington, and partly from having been opened at the Washington Centennial, May 1, 1889. The total length of the bridge and approaches is 2,380 feet. Each approach is 660 feet long, leaving 1,060 feet for the main bridge. The masonry superstructure is of granite, and includes an east and west approach, terminating in abutments from which the two great arches spring. The western approach is level; the first portion, 260 feet in length, is in earthwork supported by masonry sidewalls. The west is in masonry, including three semi-circular arches, each of 60 feet span. The eastern approach starts on a lower grade and for part of its length rises towards the bridge. There are 300 feet in earthworks, and the remaining 360 feet include three semi-circular arches of 60 feet span, and one seven-centered of 56 feet span. A clear width of 80 feet is afforded over this portion, as well as over the remainder of the structure, 50 feet of which are roadway, while 30 feet are devoted to the sidewalks. The roadway is paved with asphalt. The supporting members of the bridge proper consist of two steel arches of 510 feet span each. The roadway is 151 feet above the river level. On the approaches it is bordered by a handsome stone parapet, with bronze ornaments. The bridge proper has an iron and bronze rail. William Hutton was the chief engineer, assisted by Theodore Cooper. In order to secure a number of meritorious plans, premiums were offered for the best design. The first and second prizes were awarded to designs by C. C. Schneider and William Hilderbrand, whose plans were followed as regards the general features of the bridge.



A RUSTIC BRIDGE, admirably adapted to farm and park uses, is shown in the accompanying cut. A model of a similar bridge exhibited at Philadelphia in 1876, was 8 feet long, 3 feet 10 inches high, 16 inches broad from out to out, and its largest spars were only 1½ inches in diameter. Its strength, however, was such as to bear the weight of a full-grown man. A person capable of making an ordinary hayrick can easily construct such a bridge. No nails, cleats, bolts or screws are needed; indeed, they are worse than useless. Hempen rope is used to lash the timbers together, as shown in the cut; or, when greater permanence is required, wire rope or chains may be used instead of hempen ropes. Rough timbers with the bark on are the best materials for this purpose.

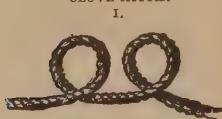
A scale is given as a convenient guide to the farm builder. But without this, assuming that the length of the bridge is 100 feet, the proportionate dimensions of the other parts should be as follows: The standard pier frame A, 32 feet long; the supporting standards B, 56 feet long; the tension timbers C, 31 feet; the cross-timbers D, 35 feet; the width of the bridge, out to out, 16 feet; width between standards of pier frames, 12 feet; and width of roadway, 11½ feet; the chief timbers, 1½ feet in diameter, and the others in proportion.

There should be 15 short pieces, like E, setting on the split spars I to bind the planks. In the binding of the spars together, all unnecessary lashing

should be avoided; hence follow the hints here given: Do not lash the timbers B at the top, or to secure the cross-pieces F G and the upper spar at H. All ropes should be well secured, and safe knots tied as shown, and with sufficient lashings to resist the strain. If, in case of a heavy bridge,

chains are used, the safest fastening would be made by passing one link through another, and then fastening as a "toggle" a piece of stout wire or small bar of iron through the inserted link, bending the ends so that the "toggle" will not slip out.

CLOVE HITCH.



II.



III.



TIMBER HITCH.



I.



II.



METHOD OF LASHING A PAIR OF SHEERS.

I.



II.



METHOD OF LASHING A DIAGONAL BRACE TO AN UPRIGHT SPAR.

I.



II.



METHOD OF LASHING A TRIPOD TRESTLE.

BRIDGETON, a city, port of entry and the capital of Cumberland county, N. J. It is situated on both sides of the Cohansey Creek, which is navigable from Delaware Bay to Bridgeton for vessels of eighty tons. It is on the Vineland Railroad, and a branch of the West Jersey Railroad, thirty-eight miles south of Philadelphia and eleven miles from Vineland. The Bridgeton and Port Norris Railroad runs southeastward to the mouth of the Maurice River—about twenty miles. Bridgeton has many churches and excellent public and private schools, three weekly and two monthly papers, one National Bank, a rolling mill, nail factory, glass works, woolen mills, leather factories, machinery works and a carriage factory. Population in 1880, 8,722; in 1890, 11,741.

BRIDGEWATER, a village of Massachusetts, twenty-seven miles south of Boston, the seat of the Bridgewater Academy and of the Bridgewater State Normal School. It manufactures cotton-gins, cotton goods, iron, augers, and paper. The State workhouse is in Bridgewater township.

BRIDGMAN, FREDERICK ARTHUR, artist and author, born in Tuskegee, Ala., Nov. 10, 1847. While but a child he declared his intention of becoming an artist, and when only sixteen years of age he went to New York and apprenticed himself to the American Bank-note Company in the engraving department. He improved his leisure meantime by studying in the Academy of Design in New York and the Brooklyn Art School. At the age of nineteen he went to Paris and enjoyed the honor of

being one of the first American students of Gérôme. At twenty-one he sent *Jeu Breton* to the Paris salon, and it was his fortune to have it hung "on the line." For several years he annually sent a painting to the salon: *The Breton Children in Carnival Time*, *The American Circus in Brittany*, *Apollo Carrying Away Cyrene*, *Bringing in the Maize*, *The Funeral of a Mummy*, *Pastimes of an Assyrian King*, and *Procession of the Bull Apis* were his contributions to the Paris salon in 1869, 1870, 1872, 1877, 1878 and 1879. Many of his paintings were suggested by trips through the Pyrenees, excursions on the Nile, and residence in Algiers. Since 1871 he has been a frequent exhibitor in the New York National Academy. To the United States centennial exhibition he sent the three canvases: *A Kybelian Woman*, *Flower of the Harem*, and *The Nubian Story-Teller*. Mr. Bridgman was awarded a medal of the second class and decorated with the Legion of Honor, at Paris in 1878; he was chosen a member of the New York National Academy of Design in 1881. His latest paintings are *My Last Price*, *Family Bath at Cairo* and *Summer on the Bosphorus*. He resides in Paris.

BRIDGMAN, LAURA DEWEY, blind deaf mute, born in Hanover, N. H., Dec. 21, 1829, died in Boston, Mass., May 24, 1889. When two years old a severe illness deprived her of sight, hearing and the sense of smell, and impaired her sense of taste. The difficult task of educating so unfortunate a child was intrusted to Dr. Samuel G. Howe, of the Perkins Institution for the Blind (see *Britannica*,



(Vol. III, p. 830), in which school she spent most of her life, becoming eventually a successful teacher there. The methods employed in her training are of interest. At first objects were given her to handle which bore their own name in raised letters; the words were then given her, and next the separate letters. These she was taught to put together to form words. The manual alphabet was next taught her, and then the use of a lead-pencil. Following this came instruction in arithmetic, geography (with relief maps), sewing and housework. Her teacher was able to explain to her concerning the existence and character of God; her religious feelings were strongly developed after this, and she found much pleasure in reading her Bible. Her hand was more susceptible to sound-vibrations than her ear. Her left eye was sensitive to a strong beam of light. Space relations were not readily comprehended by her. She seemed to enjoy life notwithstanding her great privations, was cheerful, and of a social disposition, and for years was one of the chief attractions of the school.

**BRIEF**, in law, a concise, systematic memorandum of the points of law or of fact to be developed in argument or used in the examination of a witness. In English law, the name given to the written instructions on which barristers advocate causes in courts of justice. It is an abbreviated statement of the pleadings, proofs and affidavits at law, or of the bill, answer, and other proceedings in equity, with a concise narrative of the facts and merits of the plaintiff's case, or the defendant's defense. The brief is often called "observations" in chancery proceedings. In Scotland, the corresponding term is *memorial*. *Breve* in Scotland has a different meaning. This paper should be confined to the statement of facts without argument or quotation.

**BRIENNE-LE-CHATEAU**, a town of 1,800 inhabitants in the French department of Aube, on the right bank of the river Aube, 35 miles northeast of Troyes. At the military school here (suppressed in 1790) the great Napoleon spent five years. Here, too, he was defeated by the Allies, after a desperate struggle, in the last days of January, 1814. This victory opened the way to Paris, and led to the fall of the empire.

**BRIENZ**, a Swiss town, beautifully situated at the foot of the Bernese Alps, on the northeast shore of the lake of the same name, 30 miles southeast of Berne. Population, 2,758. The lake of Brienz, which is  $8\frac{1}{4}$  miles long and  $1\frac{1}{2}$  in breadth, is an expansion of the river Aar, and is believed to have been at one time united with Lake Thun. It lies 1,857 feet above the sea, is 859 feet deep at one point, and is surrounded by lofty mountains, the principal of which is the Rothorn.

**BRIERLY HILL**, a town of Staffordshire, England. It is a place of much activity, the district abounding in coal, iron and fireclay; and there are here numerous collieries, large iron-works, glass-works, brick-works and potteries. Population, 11,546.

**BRIG, BRIGANTINE**. A brig is a square-rigged vessel with two masts. A brigantine is a two-masted vessel with the mainmast of a schooner and the foremast of a brig. A brig's mainsail is the lowest square-sail on the mainmast, whereas the mainsail of a brigantine is a fore-and-aft sail like that of a schooner.

**BRIGANDINE**, a mediæval coat of mail, made of overlapping scales of steel, sewed upon quilted linen or leather and covered with a similar substance to hide the glittering of the metal. The brigandine formed part of the equipment of the infantry soldier.

**BRIGANDS**, a name originally given to the mercenaries who held Paris during King John's imprisonment (1358), and who made themselves notorious for their ill-behavior. It was applied by Froissart to a kind of irregular foot-soldiery, and from them was transferred to common robbers; it is now used especially of such of these as live in bands in secret mountain or forest retreats. In this sense the pest has been common to most countries, by whatever name the robbers may have been known—whether the escaped slaves and gladiators of Rome, the pre-Islamite brigands of Arabia, English outlaws and highwaymen, German robber-nobles, the later banditti of Mediterranean countries and of Mexico, American stage-coach robbers, Australian bush-rangers, or the dacoits and hill-robbers of Asia. Vigorous steps have been taken during the last fifty years for their repression, and in some countries with signal success.

**BRIGANTES**, the most powerful of the old British tribes, inhabiting the country between the Humber and the Roman Wall.

**BRIGGS, CHARLES AUGUSTUS**, theologian, professor in Union Theological Seminary, born in New York city, Jan. 15, 1841. He studied in the University of Virginia for three years, in Union Theological Seminary for two years, and at the University of Berlin for three years. On his return to the United States he became pastor of the Presbyterian church at Roselle, N. J. In 1874 he was installed in the chair of Hebrew in Union Theological Seminary, New York city, and in January, 1891, was appointed to the chair of Biblical theology. He has published *Biblical Study*, *American Presbyterianism*, *Messianic Prophecy*, and is one of the editors of the "Presbyterian Review."

**BRIGGS, CHARLES FREDERICK**, author, born at Nantucket, Mass., 1804, died in Brooklyn, N. Y., June 20, 1877. He early removed to New York, where for many years he was connected with the press. The "Brooklyn Journal," "Putnam's Magazine," "New York Times," "Evening Mirror," "Brooklyn Union" and the "Independent" were papers with which he was successively connected. He was a humorous writer and fond of depicting New York life. He wrote *Harry Franco: a Tale of the Great Panic*; *The Haunted Merchant* and *Trippings of Tom Pepper*.

**BRIGHAM CITY**, an important trading town of Utah, county-seat of Box Elder county, situated near the southern shore of Great Salt Lake, at the west base of the Wasatch range of mountains. Woolen goods, leather and flour are extensively manufactured here, and it is the seat of an academy.

**BRIGHT, JOHN**, a politician, son of Jacob Bright, a cotton-spinner and manufacturer at Rochdale, Lancashire, England, born at Greenbank, near that town, Nov. 16, 1811, died in March, 1889. The family were members of the Society of Friends, and Bright was educated at a Friends' School at Ackworth, and afterward at York and at Newton. While in his father's factory he took a great interest in public questions, and before he had attained his majority made speeches upon such subjects as capital punishment, church rates, temperance and parliamentary reform.

In 1835 Bright made a foreign tour, and on his return delivered lectures on the subject of his travels, and on topics connected with commerce and political economy. When the Anti-Corn-Law League was formed in 1839, he was one of its leading members, and with Cobden engaged in an extensive Free-trade agitation. In 1843 he became member of Parliament for Durham, and, until their repeal, at public meetings and in Parliament was

incessant in his opposition to the Corn Laws. In 1847, elected one of the members for Manchester, he coöperated with Cobden in the movement in favor of financial reform. He was reelected for Manchester, and strongly opposed the policy of the Crimean war (1854). A severe illness compelled him to withdraw for a time to the Continent, and in his absence he was rejected by his constituency. Elected in 1857 for Birmingham, he seconded the motion against the second reading of the Conspiracy bill, which led to the overthrow of Lord Palmerston's government.

When the civil war in America broke out, he warmly supported the cause of the North, although his own business and the whole of the Lancashire cotton-trade suffered severely in consequence. In 1868 he accepted office as President of the Board of Trade, but in 1870 was again obliged to retire in consequence of severe illness. His health having been restored, he took office in 1873, and again in 1881, as Chancellor of the Duchy of Lancaster; he was appointed Lord Rector of Glasgow University in 1880. Mr. Bright retired from the Gladstone ministry in 1882, being unable to support the government in its Egyptian policy. His subsequent appearances in public were infrequent; but in 1883 he defended himself in the House of Commons from a charge of breach of privilege in connection with speeches delivered at Birmingham. In 1886-88 he opposed the home rule policy of Mr. Gladstone.

BRIGHT, RICHARD, physician, born at Bristol, Sept. 28, 1879, died Dec. 16, 1858. He studied at Edinburgh, Berlin, and Vienna, and from 1820 was connected with Guy's Hospital. He made many important medical observations, and wrote numerous medical dissertations. See *Britannica*, Vol. IV, p. 345. His *Travels Through Lower Hungary* (1818) contains a valuable account of the Gypsies.

BRIGNOLI, PASQUALE, singer, born at Naples, Italy, in 1824, died in New York city, Oct. 30, 1884. He was given a fine musical education and became a talented pianist. He began his vocal training at 21, and, encouraged by his concert-room success, appeared in opera in Paris, London and the United States. Brignoli possessed a tenor voice of great volume and sweetness.

BRIGUS, a town of Newfoundland, capital of the district of Brigus, and a port of entry, situated on Conception Bay, about 40 miles northwest of St. Johns. The harbor is good, and the inhabitants are chiefly engaged in fishing. There is also a considerable trade in agricultural products. The principal buildings are the district jail and a convent of the Sisters of Mercy.

BRIHUEGA, a town of New Castile, Spain, situated on the Tajuña, 20 miles northeast of Guadalajara. Population, 4,140. Here, in 1710, during the War of the Succession, the English general Stanhope, owing to the failure of his allies to afford him support, was defeated by the Duke de Vendôme, and compelled to surrender his force of about 5,500 men.

BRILL, a common European flat-fish, *Rhombus lewis*, of the family *Pleuronectidae* (see *Britannica*, Vol. XII, p. 692), belonging to the same genus as the turbot, from which it is distinguished by its being more elongated in form, by the absence of bony tubercles, by the small, almost smooth scales, etc. It is seldom above eight pounds in weight.

BRILLAT-SAVARIN, ANTHELME, French gastronome, born at Belley, April 1, 1775, died Feb. 2, 1826. He was a deputy in 1789, and mayor of Belley in 1793; for a time resident in Switzerland, he afterwards came to America, where he played in the orchestra of a theater in New York. Returning to France, he became a member of the Court of

Cassation, which position he held from 1796 until his death. Shortly before this event, appeared his *Physiologie du Gout* (1825), an elegant and witty compendium of the art of dining. It has been repeatedly republished and translated; the latest English form being *A Handbook of Gastronomy*, with 52 etchings by Lalange (1884).

BRINE-SHRIMP, a genus of small animals belonging to the Branchiopod division of Crustacea, *Artemia salina*, found in brackish water and in brine. They are hatched at the lowest level of crustacean life as *Nauplii*. The full-grown animal is about half an inch long, and, having no shell, is transparent. There are five species of *Artemia*, all found in salt-lakes or in brine-pools where salt is manufactured. Of these species the most unlike are *Artemia salina* and *Artemia milhausenii*.

BRINK, BERNARD TEN, philologist, born at Amsterdam in 1841; studied philology at Münster and Bonn; in 1870 became professor of modern languages and literature at Marburg, and in 1873 at Strasburg. He has devoted himself largely to English philology. Among his works are *Chaucer-Studien* (1870), *Geschichte der Englischen Literatur* (1874; English translation 1883), *Chaucer's Sprache und Verskunst* (1884), and a book on *Beowulf* (1888).

BRINK, JAN TEN, a dutch writer, born June 15, 1834, at Appingadam; studied theology at Utrecht, but early devoted himself to literary pursuits. After a short residence at Batavia he returned in 1862 to teach Dutch at The Hague, and since that time he has earned for himself a prominent place as a critic, especially in the departments of fiction and belles-lettres. A popular novel of his is *Het Verloren Kind* (1879), and his *Causeries over Moderne Romans* (1885) is a valuable critique of modern novels.

BRINVILLIERS, MARIE MADELEINE MARQUISE DE, poisoner, was the daughter of Dreu d'Aubray, lieutenant of Paris, and in 1651, while still young, was married to the Marquis de Brinvilliers. She afterward became infatuated with a handsome young officer, the Seigneur de Sainte-Croix. Her father caused him to be imprisoned in the Bastille, where he learned from an Italian the properties of arsenic. On his release he imparted this knowledge to his mistress, who, to test the efficacy of the poison, tried its effects on patients in the Hotel Dieu. Having satisfied herself, she resolved to destroy her father, and after eight months of slow poisoning she administered a dose which caused his death. No one suspected his daughter, who, with the assistance of Sainte-Croix and a domestic, next poisoned her two brothers and her sisters; her object being to procure means for continuing her extravagant style of living with her paramour. She made several attempts to poison her husband; but Sainte-Croix is said to have administered antidotes, dreading that he should be compelled to marry the widow. Sainte-Croix died suddenly in 1672, and left documents inculcating the marchioness. She escaped to England, afterwards traveled in Germany, and finally took refuge in a convent at Liège. From this, however, she was decoyed by an officer of justice disguised as an abbé, and conveyed to Paris. Among her papers was found a general confession of her crimes, the truth of which she acknowledged on being put to the torture, and on July 16, 1676, she was beheaded at Paris.

BRIQUETTE, the name, originally French ("small brick"), given to a comparatively new form of fuel—an admixture of coal-dust with pitch or some other cementing material, molded by pressure and heat into a brick or ball.



**BRISTOL**, a manufacturing village of Connecticut, about twenty miles west of Hartford. It has manufactories of clocks, water-wheels, and stockings, and several foundries and machine shops. Copper is found in the vicinity.

**BRISTOL**, a village of Tennessee, situated on the boundary line of Virginia, about a hundred and thirty miles east of Knoxville. That part of the town which lies in Virginia is known as Goodson. Here are important manufactories of machinery, brooms, flour, tobacco, veneer, canned goods, cottons, woollens, iron, and lumber. Bristol is the seat of King College and of Sullins College.

**BRISTOL BAY**, an arm of Bering Sea, lying immediately to the north of the peninsula of Alaska. It receives the water of two large lakes, by which communication with the interior is opened up for a considerable distance.

**BRISTOL CHANNEL**, an inlet to the Atlantic Ocean, in the southwest of England, between South Wales on the north and Devon and Somerset shires on the south. It is about 80 miles long, and 5 to 43 miles broad; the depth ranging from 5 to 40 fathoms. It is the largest inlet in Britain.

**BRISTOW**, BENJAMIN HELM, statesman, born in Elkton, Todd county, Ky., June 20, 1832. He graduated at Jefferson College, Pa.; entered the legal profession and practiced in Kentucky. He enlisted in the Union army and served throughout the civil war. He successively held the offices of State senator, elected while still in the field (1863-65), U. S. district attorney for the Louisville district (1865-70), solicitor-general for the United States (1870-72), attorney for the Texas Pacific railroad, secretary of the treasury under President Grant (1874-76 when he resigned). In 1876 he was one of the candidates for presidential nomination.

**BRISTOW STATION**, a village of Prince Williams county, Va., on the Orange and Alexandria railroad. Two battles were fought here between the Confederate and Union forces, one on Aug. 27, 1862, the other Oct. 14, 1863.

**BRITANNIA METAL**, an alloy (see *Britannica*, Vol. XVIII, p. 725), of which the essential metal is tin, with varying proportions of antimony and copper, to which bismuth, zinc, and lead are occasionally added. This alloy is extensively used for tableware, being thinly coated with silver and sold as silver-plate. The manufacture was begun at Sheffield in 1770, and Sheffield and Birmingham are still the chief seats of the manufacture. In 1824 it was made in Taunton, Mass., by Isaac Babbitt. Since electroplating came into general use the trade in Britannia metal-ware has greatly increased.

**BRITISH ASSOCIATION**, an association whose object is, by bringing together men eminent in all the several departments of science, to assist in the progress of discovery, and to diffuse over the whole country the latest results of scientific research. A prevailing impression that England had fallen behind other countries, both as to the general estimation in which scientific men were held and the prosecution of science itself led to its formation, and the honor of being its founder belongs to Sir David Brewster. See *Britannica*, Vol. IV, p. 277. A meeting of those who were favorable to the design was held at York in the year 1831, at which the constitution of the society was determined, the several sections had their provinces assigned to them, and subjects were proposed on which reports were to be drawn up and read at the ensuing meeting. This took place at Oxford in 1832, and from this date it may be said to have been in complete and successful operation. The annual meeting takes place about the end of August and lasts more than a week. At the close of each meeting the

place at which the next meeting shall be held is determined two years in advance, and a president appointed. Many of the successive presidents have been men of social and scientific eminence. A volume is published annually containing reports on the progress of science, addresses delivered, papers and abstracts of papers read at the meetings, and copies are presented to societies and libraries at home, in the colonies, and abroad.

**BRITON FERRY**, a seaport of South Wales, in Glamorganshire, at the mouth of the river Neath, 2½ miles from the busy town of Neath, to which it serves as a port. Population of parish, 6,061.

**BRITTLE-STARS** (*Ophiuroidea*), one of the classes of *Echinodermata*, including forms not far removed from star-fishes, but differing markedly in the more centralized body, more sharply defined arms, and more active habit. An illustration is given in *Britannica*, Vol. VII, p. 634. The popular name "brittle-star" refers to the extreme ease with which the arms break. Another common name, "sand-stars," refers to their occasional occurrence on the shore; the technical title, *Ophiuroid*, describes the snake-like coils of their "arms."

**BROADDUS**, ANDREW, clergyman and author, born in Caroline county, Va., Nov. 4, 1770, died in Salem, Va., Dec. 1, 1848. His education was limited, but he had a mind of great capacity. At the age of eighteen he united with the Baptist Church, and soon began to exhort and then to preach. His eloquence and enthusiasm made him popular, and he received flattering calls to pastorates in New York, Philadelphia, Boston, and other cities, all of which he refused, preferring the life of a country pastor. He published a number of books and wrote much for the press.

**BROADS**, THE NORFOLK, a series of inland lakes of England, usually said to be formed by the widening or "broadening" out of the rivers. More probably their origin is due to a change in the general level of the land surface of that county even within historic times; for the river Yare was an estuary of the sea, in which herrings were caught at the time of Domesday. The broads *par excellence* are those up the Bure or North River, and its tributaries, the Ant and the Thurne. The first (Wroxham) is the largest and deepest, there being sailing-water for large boats all over it. Up the Ant there is a fine broad at Barton, and up the Thurne there is a very large one at Hickling and two others at Martham and Horsey. The broads have grown greatly in favor with holiday-makers of late, and the influx of visitors has destroyed the extreme quiet which was the great charm of the place to naturalists and fishermen. To the antiquary the district is full of interest, the ruins of St. Benet's Abbey, of Burgh Castle (Roman), and many interesting churches, being within easy reach.

**BROADSIDE**, the simultaneous discharge of all the guns on one side of a ship of war. The fighting power of a ship was formerly estimated by the weight of all the shot and shell that could be fired off at once from one side, or half of the ship. With ironclad turret-ships the term is inapplicable.

**BROADSWORD**, a term applicable to any form of sword having a broad, flat blade of which the side as well as the point is used for cutting. The term is applied to such a sword as is distinguished from one with a narrow blade, or from a three-sided thrusting-sword.

**BROADUS**, JOHN ALBERT, clergyman, born in Culpeper county, Va., Jan. 24, 1827. He completed his education at the University of Virginia, and for two years taught there as assistant professor of ancient languages. He belonged to the Baptist denomination, and his first pastoral work was in

Charlottesville. In 1859 the Southern Baptist Theological Seminary, Greenville, S. C., now in Louisville, Ky., called him to the chair of New Testament interpretation and homiletics. He has published *The Preparation and Delivery of Sermons*; a series of papers on *Recollections of Travel*; *Lectures on the History of Preaching*; *Three Questions on the History of Preaching*; *Commentary on Matthew*; and *Sermons and Addresses*. The first book mentioned in the list has been largely adopted as a text-book in theological schools. Dr. Broadus is considered the finest Greek scholar and New Testament critic in his denomination in the South.

BROCA, PAUL, a distinguished French surgeon and anthropologist, born at Sainte-Foy-le-Grand, Gironde, in 1824, died July 9, 1880. After pursuing his medical studies with distinction he was named professor of Surgical Pathology in the Faculty of Medicine in Paris, and surgeon successively of the four hospitals of Bicêtre, the Salpêtrière, Saint-Antoine, and La Pitié. He was also director of the Laboratory of Anthropology in the High School of Paris. Celebrated not only as a surgeon, Broca was regarded as one of the most learned masters of the existing school of anthropology. He founded the Paris Anthropological Society, of which he was secretary till his death, and he was a member of all the leading medical, biological and anatomical societies of Paris and the Continent. Elected a member of the Academy of Medicine in 1866, he was decorated with the Legion of Honor in 1868. Broca was a voluminous writer, and among his more important works may be mentioned the following: *Des Anesthésies et de leur Traitement* (1856), *Sur l'Anesthésie Chirurgicale Hypnotique* (1859), *Etudes sur les Animaux Ressuscitants* (1860), *Instructions Générales pour les Recherches Anthropologiques* (1865), *Traité des Tumeurs* (1865), *Caractère Physique de l'Homme et des Primates* (1869). He also collaborated in the production of several important medical and physiological works. In 1878 he presided over an International Congress on Anthropology held in Paris.

BROCADE (Spanish, *brocado*). This term is applied to a silk material variegated with gold or silver, or ornamented with raised flowers, foliage, and various sorts of figures; the name is also applied to other stuffs wrought in the same manner. Oriental brocades date from a remote period, but there were probably no European stuffs of this nature earlier than the 13th or 14th century, when they were made in Italy and Spain. In common with damasks, figured tissues, and other varieties of ornamented silks made in past times, Italian and Spanish brocades, dating from the 14th to the 17th century, as well as those of Persia and Asia Minor, extending over a longer period of time, are extremely valuable objects of study for the textile designer and decorative artist. Fine examples of these are to be found in some continental museums.

BROCCOLI, a well-known and much esteemed garden vegetable, one of the many varieties which cultivation has produced of the *Brassica oleracea*, the common kale or cabbage. See *Britannica* Vol. IV, 618; Vol. XII, p. 279. Broccoli is said to have been originally brought to Italy from Cyprus about the middle of the 16th century. It is closely similar to the cauliflower, having the same general characteristics, but a harder constitution.

BROCHS, the local name applied in the north of Scotland to the ancient, dry-built, circular castles known also to the Gaelic-speaking people as *duns*. See *Britannica*, Vol. XVII, p. 348; also *ROUND TOWERS*, Vol. XXI, p. 22.

BROCHURE, a French word (from *brocher*, to stitch), equivalent to the English word pamphlet.

BROCK, SIR ISAAC, soldier, born on the Island of Guernsey, Oct. 6, 1769; killed in battle at Queens-town, Can., Oct. 13, 1812. As a member of the British army he served in Jamaica, Barbadoes, the North Holland expedition and along the Baltic. In 1810 he was sent to Upper Canada, having been appointed lieutenant-general. He prepared for war with the United States, advanced to Detroit and compelled the surrender of the place. From here he went to the Niagara frontier, where a battle was fought with the Americans in which Brock was killed. He had been promoted to the rank of major-general. The government awarded pensions to his father's family, and a church and monument were erected to his memory.

BROCKEN (*Mons Brukerus of the Romans*), popularly known as the *Blockberg*, the highest summit of the Harz Mountains. It is in Prussian Saxony, about 20 miles southwest of Halberstadt, and has an elevation of 3,740 feet above the sea. See *Britannica*, Vol. XI, pp. 309, 507.

BROCKPORT, a village of New York, situated in a fertile and wealthy agricultural district, about 17 miles west of Rochester. Farming implements and other machinery are extensively made here, and it is the seat of a normal school. Population in 1890, 3,742.

BROCKRAM (signifying "broken rock"), is the local name given to the breccias of Lower Permian age which occur in the North of England, or near Appleby and Kirky-Stephen. These breccias consist largely of fragments of limestone set in a red sandy matrix, and are occasionally quarried for limestone and building-stone.

BROCKTON (formerly North Bridgewater), a wealthy manufacturing town of Massachusetts, about 20 miles south of Boston. It contains extensive establishments for the manufacture of boots, shoes and other goods. Population in 1890, 27,294.

BROCKVILLE, a beautiful town of Ontario, Can., county-seat of Leeds county, and a port of entry. It is situated on the St. Lawrence River, about 125 miles above Montreal. It is an important center of trade, and contains numerous and extensive manufacturing of machinery, steam engines, agricultural implements, stoves, hardware, chemicals, white-lead, sash and blinds, leather, gloves, flour and lumber.

BRODHEAD, a town of Wisconsin, situated on Sugar River, about 35 miles south of Madison. It is the seat of a high school, and manufacturing of flour, machinery, carriages, wagons, corn-planters, and plows.

BROGLIE, ALBERT DUC DE, son of Achille (see *Britannica*, Vol. IV, pp. 359-60), born June 13, 1821; elected Academician 1862; returned as a deputy 1871, and was for a few months ambassador at London. As leader of the Conservative Right Center he procured the election of MacMahon in 1873; in the same year, and again in 1877, he was made premier, but was both times forced to resign by Gambetta's exposure of his reactionary tactics. His most important literary work is *The Church and the Roman Empire in the Fourth Century*. He has also written two works on Frederick the Great from family papers.

BROGUE, a light shoe made of rawhide, with the hair outward, gathered round the ankle, which was formerly in use among the native Irish and the Scottish Highlanders. The term brogue is also used to designate the peculiar pronunciation of English that distinguishes natives of Ireland.

BROME-GRASS, a popular name for grasses of the genus *Bromus*, of which there are numerous species distributed chiefly through the northern temperate zone. They are mostly coarse grasses, of comparatively little value.



**BROMELIACEÆ**, a natural order of endogenous plants, allied to *Amaryllidaceæ*, but usually distinguished by their perianth-whorls differentiated as calyx and corolla, and by their habit. The species are all natives of tropical or subtropical regions of America. Many of them are epiphytic, and are often called air-plants. *Tillandsia usneoides*, Beard Moss or Spaniard's Beard of the West Indies and of the southern United States, hangs from the trees like the lichens of colder climates. It yields a fiber which is used instead of hair for stuffing mattresses. The order includes the pineapple (*Ananas*) and some valuable fiber-plants of the genera *Bromelia* and *Karatas*. Many species are cultivated in hot-houses on account of their peculiar vegetation and showy flowers.

**BROMIC ACID**, the best-known compound of bromine and oxygen. It forms a whole series of salts called Bromates, none of which are of importance. They are mostly crystalline, but their watery solutions readily decompose when evaporated. When heated, they liberate oxygen and form bromides. Mixed with sulphur or charcoal, they explode by percussion, and in this and other properties resemble the chlorates.

**BROMSEBRO**, a village and castle of Sweden, 27 miles south of Kalmar. Treaties were signed here between Sweden and Denmark in 1541, 1641, and 1645.

**BRONI**, a town of Northern Italy, with mineral springs, 11 miles southeast of Pavia. Near by is the castle of Broni, where Prince Eugene obtained a victory over the French in 1708. Population, 5,147.

**BRÖNN**, HEINRICH GEORG, a German naturalist, born at Ziegelhausen in 1800, died July 5, 1862. He was educated at Heidelberg, where in 1828 he commenced a course of lectures on natural history and palæontology. In 1833 he was nominated professor of physics, and was afterwards appointed to the zoölogical lectureship. His most important geological work is *Lethæ Geognostica* (1834); other works are *Geschichte der Natur* (1841-49), and *Allgemeine Zoölogie* (1850). The last mentioned work was the first attempt to develop zoölogy in its entirety with reference to extinct organisms.

**BRONZE-WING** and **BRONZE PIGEON**, names given in the Australian colonies to certain species of wild pigeon, on account of the bronze color of their plumage. The common bronze-wing or bronze-winged ground dove, *Phaps chalcoptera*, abounds in all the Australian colonies. It is often seen in flocks, feeds on the ground, and builds its nest chiefly on low branches of trees growing on meadow lands or near water. It often flies long distances to water, and is considered a sure guide. It is a plump bird, often weighing a pound, and is much esteemed for the table. The brush bronze-wing, *Phaps elegans*, not so plentiful, is found chiefly in Tasmania and the southern parts of Australia.

**BRONZITE**, silicate of magnesia and ferrous oxide, a rock-forming mineral belonging to the Pyroxene group. It sometimes has a bronze-like luster due to microscopic inclusions. See *Britannica*, Vol. XVI, p. 415.

**BROOKE**, STOFFORD AUGUSTUS, born in Letterkenny, Donegal, Ireland, in 1832. After a brilliant course at Trinity College, Dublin, he took orders, and after holding various curacies was incumbent of St. James's Chapel from 1866 to 1875, and subsequently of Bedford Chapel, Bloomsbury, where his ability soon secured him a prominent place among the preachers of London. In 1872 he was appointed chaplain-in-ordinary to the Queen. In 1880, from conscientious motives, he seceded from the Church of England, but continued to preach in his proprietary chapel in Bloomsbury. His works comprise

*Life of Frederick Robertson of Brighton* (1865), *Theology in the English Poets* (1874), *Primer of English Literature*, and *Milton* (1876), and six volumes of *Sermons* (1868-88).

**BROOK FARM**, ASSOCIATION FOR EDUCATION AND AGRICULTURE, THE. See *Britannica*, Vol. XX, p. 567.

**BROOKFIELD**, an important railroad center of Missouri. It is situated on Yellow Creek, about 25 miles east of Chillicothe. It contains the extensive machine shops and round-house of the Hannibal & St. Joseph Railroad. Coal is found in the vicinity.

**BROOKHAVEN**, an important manufacturing and lumbering town of Mississippi, the county-seat of Lincoln county. A female college is here located.

**BROOKINGS**, a town of South Dakota, county-seat of Brookings county, situated in a fertile agricultural district. It has large milling interests, and is the seat of the State Agricultural College.

**BROOKLIME**, a plant (*Veronica Beccabunga*) having a slight resemblance to water-cress, growing in ditches, water-courses and wet places near springs. It is a species of speedwell.

**BROOKLYN**, a city of Iowa, about a hundred miles west of Davenport. It contains a number of grain-elevators, a steam flouring-mill and a large round-house.

**BROOKLYN**, the second city of the State of New York. For its early history and local map, see *Britannica*, Vol. IV, pp. 370-71. Its population was 206,661 in 1860, 396,099 in 1870, 566,689 in 1880, and 804,377 in 1890. Its magnificent Prospect Park has been greatly improved, and the two boulevards connected with it have been extended, one to Coney Island and the other to East New York. The city now covers an area of nearly 25 square miles, and its boundary line reaches an extent of about 22 miles, with a water frontage of eight and one-half miles. The Long Island Railway system connects the city with every part of Long Island, and two extensive elevated railway systems (the first opened in 1885) furnish rapid transit from the suspension bridge and the principal ferries to the more distant portions of the city. The Atlantic Dock embraces within its piers an area of about 41 acres, Brooklyn Basin 40 acres and the Erie Basin 60 acres. They are the most extensive works of the kind in the United States, and are lined with immense storehouses for grain and other freight, forming probably the largest grain depot in the world. The U. S. Navy Yard occupies about 40 acres, and contains extensive work-shops and an immense dry-dock costing about \$1,000,000. The principal public buildings are the Court House, City Hall, Post-Office (completed in 1891), Academy of Music, with seating capacity of 2,400, Academy of Design, Municipal Building, Hospitals, House of Correction, Alms House, Lunatic Asylum, and Deaf Mutes' Asylum. Charitable institutions are numerous. The Seney Methodist Hospital, completed in 1888, is one of the largest and most thoroughly equipped hospitals in America. The churches number about 300. There are 11 distinct libraries: the Brooklyn Library contains 105,000 volumes; the Long Island Historical Library, 45,000 volumes; The Brooklyn Institute and Youtths' Free Library, 16,000; Law Library, 11,000; Long Island Free Library, 5,000; Pratt Institute Library, 20,000, and the Y. M. C. A. Library, 10,000. Educational institutions abound, many being of a high order. There are 78 public schools, and in 1890 there were registered 86,000 pupils. The value of school property is about \$6,000,000. Among the higher institutions of learning are the Brooklyn Institute, embracing 14 departments; Adelphi Academy; Polytechnic Institute; Pratt Institute; St. Francis Col-

lege, and St. John's College. There are seven gas-light companies, using for distribution 479 miles of mains, and several electric lighting companies. There are 26 wards, the government of the city being vested in a mayor and board of aldermen.

BROOKS, CAROLINE SHAW, sculptor, born in Cincinnati, Ohio, April 28, 1840. She first attracted notice by modeling in butter a head of *Dreaming Iolanthe*, and exhibiting it at the Centennial Exhibition in 1876. She subsequently chisled marble busts of Garfield, George Eliot and others.

BROOKS, CHARLES TIMOTHY, author, born in Salem, Mass., June 20, 1813, died in Newport, R. I., June 14, 1883. He graduated from Harvard in 1832, and after pursuing a course of study in theology began to preach in 1835. Two years later he became pastor of a Unitarian church in Newport, R. I. He published poems, sermons, and a book concerning his travels in India. He is best known as a German translator. Some of his translations are Schiller's *William Tell*; *Homage of the Arts*; Goethe's *Faust*; Richter's *Titan*, and *Hesperius*.

BROOKS, ERASTUS, brother of James Brooks, born in Portland, Me., Jan. 31, 1815. He was a printer and journalist, being successively connected with the "Maine Yankee," the "Haverhill Gazette," and the "New York Express." During 16 successive sessions of Congress he was Washington correspondent of the "Express." In 1843 he went abroad as foreign correspondent. He was several times elected to the New York legislature by the Democratic party.

BROOKS, JAMES, journalist, born in Portland, Me., Nov. 10, 1810, died in Washington, D. C., April 30, 1873. He found much difficulty in obtaining an education on account of his father's death and the poverty of the family. His employer aiding him he graduated at Waterville in 1831, and began the study of law. He was already a newspaper correspondent, and in 1832 he went to Washington and from there contributed articles to the "Portland Advertiser." These were the first "Washington letters," and they set the fashion. He traveled through the South and Europe, sending to the newspaper accounts of his trips. In 1836 he started the "New York Express." He was a member of the Maine legislature (1835), the New York legislature (1847), and of Congress (1849). He was a member of the American party up to 1861, when he became a Democrat. From 1865 to 1873 he was in Congress. In the last-mentioned year he was censured by Congress for having stock in the *Crédit Mobilier*. The mortification caused by this rebuke is thought to have hastened his death. He was in 1869 one of the Government directors of the Union Pacific railroad. In 1871 and 1872 Mr. Brooks made a voyage around the world, and wrote a description of his travels.

BROOKS, MARIA GOWEN, born in Medford, Mass., about 1795, died in Matanzas, Cuba, Nov. 11, 1845. Her father was a man of literary tastes, which she inherited. At the age of 19 she wrote lyrics and a metrical romance. She published *Judith*, *Esther*, and *Other Poems*, by a *Lover of the Fine Arts*; *Zophiel*; *Idomen*, or the *Vale of Yumuri*, and an *Ode to the Departed*.

BROOKS, NOAH, author, born in Castine, Me., Oct. 30, 1830. He has been connected with the "Alta Californian," "New York Times," and "Tribune," but is best known as a magazine writer and the author of books for young people.

BROOKS, PHILLIPS, clergyman, born in Boston, Mass., Dec. 13, 1835. In 1855 he graduated at Harvard, and then studied theology at the seminary in Alexandria, Va. He was ordained in 1859, and made rector of the Church of the Advent at Philadelphia.

Three years later he was called to Holy Trinity in the same city, and after remaining with that church for seven years he became rector of Trinity Church, Boston, where he has since remained. Mr. Brooks is considered one of the finest orators in the Protestant Episcopal Church. He is noted for his "low church" views, and has frequently preached in the pulpits of other denominations. He is a very popular lecturer and exerts a powerful influence, especially over young men. He has declined calls to several churches, and also a professorship at Harvard. *Lectures on Preaching*; *Sermons*; *The Influence of Jesus*; *Baptism and Confirmation*, and *Sermons Preached in English Churches*, are among his published works.

BROOKS, PRESTON SMITH, Congressman, born in Edgefield District, S. C., Aug. 4, 1819, died in Washington, D. C., Jan. 27, 1857. He graduated at the State University; was admitted to practice law, elected to the legislature in 1844, and served in the Mexican war. He was three times sent to Congress as a State-rights Democrat. He is remembered chiefly from his brutal attack on Senator Sumner, May 22, 1856 (see *Britannica*, Vol. XXII, p. 643) on the floor of the Senate after the adjournment of the members. He repeatedly struck Sumner on the head with a cane, till the latter fell insensible to the floor. Sumner's speech on Kansas had provoked the wrath of Southern members, and Brooks took this method of showing his disapproval. The vote was taken afterwards to expel him from the Senate, but his friends were in the majority, and the motion did not pass. He was afterwards implicated in a quarrel with Anson Burlingame, and a duel was arranged to be fought in Canada, but Brooks failed to appear;—he dared not risk "going through the enemy's country."

BROOKVILLE, a village of Indiana, county-seat of Franklin county, situated on the White-water River, about 40 miles northwest of Cincinnati. The river furnishes an immense water-power for the manufacture of paper, flour and machinery. Brookville is the seat of Brookville College.

BROOM, a popular name given to a number of species of shrubs, characterized by long, slender branches and yellow flowers. The common broom, *Cytisus*, or *Sorothamnus scoparius* (See BOTANY, *Britannica*, Vol. IV, pl. 5), is a well-known native of Britain, the continent of Europe, and Northern Asia, growing in dry soils, and ornamenting hedgebanks, hills and bushy places in May and June, with its large yellow flowers. It is famous as the *Planta genista* (French *Plante genêt*), which was the badge of the Plantagenets. In South Germany it is sometimes planted for its fibers; the flowers were formerly employed in medicine, and as a yellow dye. Spanish broom (*Spartium junceum*), a closely allied species, is a native of the South of Europe. It is the *Spartium* of the ancients, and the fiber of the branchlets has been used from time immemorial in some parts of Italy, France, and Spain for the making of canvas, nets, ropes, etc. Dyers' broom (*Genista tinctoria*) is, with other members of the same genus, a well-known source of yellow coloring matter.

BROOM-CORN, a variety of *Sorghum vulgare*, a reed-like grass, growing to a height of eight or ten feet. It is a native of India, but largely cultivated in North America for the manufacture of brooms and whisks, which are made of the tops of the culms and the branches of the panicle.

BROOME, SIR FREDERICK NAPIER, was born in Canada in 1842, and emigrated to New Zealand in 1857. Seven years later, while on a visit to England, he married Lady Baker, whose *Station Life in New Zealand* (1869) quickly became popular.



Broome subsequently returned to England, and in 1875 was appointed Colonial Secretary of Natal, two years later of Mauritius, and at the close of 1882 Governor of Western Australia. He was knighted in 1877.

**BRORA BEDS**, a series of strata occurring at Brora, a village in Sutherlandshire, of the same age as the Inferior Oolite of Yorkshire. They are chiefly remarkable for the occurrence in them of a seam of coal of good quality  $3\frac{1}{2}$  feet thick, being the thickest stratum of true coal hitherto discovered in any secondary strata in Britain.

**BROSE**, a Scotch dish prepared by pouring boiling water, milk, or the liquor in which meat has been boiled on oatmeal, and mixing the ingredients by immediate stirring. When the brose is made with water, butter is usually added. The dish is denominated, according to the liquid used, *kail-brose*, *water-brose*, or *beef-brose*. *Athole-brose*, a famous Highland cordial, is a compound of honey and whisky, so called from Athole, a district of Perthshire, Scotland.

**BROTHERHOODS**, RELIGIOUS, numerous societies instituted in the Middle Ages for pious and benevolent purposes. Where the rules of monastic life appeared too narrow and severe, the Romish Church favored a freer form of consecrated life without vows other than that of devotion to good works or penitential exercises; but in many other respects, as in living together and the like, the brotherhoods resembled the spiritual orders. Several of the confraternities that either did not seek or did not obtain the recognition of the Church, assumed the character of sect, and being suspected of heresy were severely persecuted. Even within the Protestant churches single brotherhoods have been formed, as the Ranneh Hans, founded by Wichern at Hamburg in 1833; those formed by Father Ignatius and the Copley Fathers at Oxford are Anglican brotherhoods.

**BROTHERS**, a name given to a group of six or eight rocky islets immediately outside the strait of Babel-Mandeb, varying in height from 250 to 350 feet. Brothers is also the name given to three isolated mountains near the coast of New South Wales, between Harrington Inlet to the south and Port Macquarie to the north. They are valuable as landmarks.

**BROTHERS, RICHARD** (1757-1824), the originator of the Anglo-Israelite craze, born in Newfoundland in 1757, and in 1772 entered the British navy, which he quitted with a lieutenant's half-pay in 1789. Refusing, from conscientious scruples, to take the oath requisite to enable him to draw his half-pay, he was reduced to great distress, and became an inmate of the workhouse. In 1793 he announced himself as "the Nephew of the Almighty, and Prince of the Hebrews, appointed to lead them to the land of Canaan," and in 1794 he published a book, *A Revealed Knowledge of the Prophecies and Times*. For prophesying the death of the king and the destruction of the monarchy he was committed in 1795 to Newgate, and thence soon after transferred to a lunatic asylum. His disciples included Nathaniel Halhed, the M. P. and orientalist; Sharp, the engraver (See *Britannica*, Vol. XXI, p. 781); and Finlayson, a lawyer from Fife. Brothers was released from the asylum in 1806, and died Jan. 25, 1824.

**BROTHERS, LAY**, an inferior class of monks, not in holy orders, but bound by monastic rules, and employed as servants in monasteries.

**BROTHERS OF THE CHRISTIAN SCHOOLS**, an order of Roman Catholic laymen, devoted chiefly to the education of the poor. It was founded in France in 1679. The order has under its control

nearly fifteen hundred houses in various parts of the world. In the United States it has many colleges, academies, and other institutions, mostly educational, under its management.

**BROUGH, JOHN**, the "war governor" of Ohio, born at Marietta, Ohio, in 1811, died in Cleveland, Aug. 29, 1865. His early education was obtained chiefly in printing offices, and he fitted himself to enter the Ohio University. He was for a time proprietor of the "Washington County Republican" and later of the "Lancaster Eagle." He was clerk of the Ohio senate, and afterwards sat as a member of that body. Elected to the office of State auditor he gave careful attention to the financial system. He was next connected with the "Cincinnati Enquirer" and at the same time practiced law. Each paper with which Mr. Brough was successively connected became, under his management, a powerful Democratic organ. In 1848 he left politics, but during the civil war, in 1863, he was urged to accept the nomination for governor, Clement L. Vallandigham, who had been court-martialed and was then living in exile, being the opposing candidate. Brough was elected by a very large majority. He served his State with patriotism and fearlessness.

**BROUGHAM, JOHN**, actor and playwright, born in Dublin, Ireland, May 9, 1810, died in New York, June 7, 1880. His father, an Irishman of good family, died young, leaving his widow in great destitution. The son was brought up by an eccentric and rich uncle, who sent him to the University. The stage attracted him, and when his uncle met with financial misfortune the young man went to London in 1830, and entered the dramatic profession, finding a friend in Mme. Vestris, afterwards Mrs. Charles Mathews, who at that time was manager of two theaters. For fifty years he followed the profession, as author of plays, manager of theaters, and actor in Dublin, London, and New York, and was usually successful; yet, but for the generosity of friends, his last years would have been spent in poverty. A benefit was given him in New York, and an annuity bought with the proceeds. He wrote *Life in the Clouds*, *Love's Livery*, *Enthusiasm*, *Playing With Fire*, and many other plays. He was editor and proprietor of the "Lantern," a comic paper, and published collections of his writings, entitled *A Basket of Chips* and the *Bunsby Papers*.

**BROUGHTON, RHODA**, novelist, native of North Wales, born Nov. 29, 1840. Her first work, *Cometh Up as a Flower*, published in 1867, was at once popular, and was closely followed by *Not Wisely but Too Well* (1867), *Red as a Rose is She* (1870), *Nancy* (1873), *Joan* (1876), *Belinda* (1883), *Doctor Cupid* (1887), and *Alas* (1890).

**BROUGHTY-FERRY**, a town of Forfarshire, and a favorite watering-place, on the Firth of Tay,  $3\frac{1}{2}$  miles east of Dundee. On the shore stands a castle built in 1498, and repaired in 1860-61, as a defense for the Tay. Population, 7,923.

**BROWN, AARON VENABLE**, statesman, born in Brunswick county, Va., Aug. 15, 1795, died in Washington, D. C., March 8, 1859. A lawyer, in the legislature almost continuously from 1821 to 1832, he was elected to Congress in 1839, 1841 and 1843; was governor of Tennessee, and held other political offices under the Democratic party, and was postmaster-general under President Buchanan. He instituted some reforms in his department, such as shortening the mail route to California by crossing the isthmus of Tehuantepec.

**BROWN, BENJAMIN GRATZ**, statesman and soldier, born in Lexington, Ky., May 28, 1826, died in St. Louis, Mo., Dec. 13, 1885. He graduated at the Transylvania University in his native city in 1845

and at Yale in 1847; studied law at Louisville, and about 1850 took up his residence in St. Louis. He was a member of the Missouri legislature from 1852 to 1858, during which time he established the "Missouri Democrat," which advocated Republican sentiments. During the civil war he favored the Union and saw some military service. From 1863 to 1867 he was United States Senator from Missouri, and in 1870 was elected governor of the State. In 1872 he was candidate for vice-president on the Greeley ticket.

BROWN, CHAD, or CHADD, elder in the Baptist church. The dates of his birth and death are uncertain, but he probably died in 1665. He was the first elder of the oldest church of the denomination in America, and was chosen to succeed Roger Williams as leader in the Providence colony. Many religious and civil controversies arose in the settlement which, but for Elder Brown's firmness and judicious rulings, would have been settled by physical force. The good elder earned the name of "Peacemaker," and to his memory a stone was erected over his grave a century after his death.

BROWN, FORD MADDOX, author and painter, born at Calais, France, in 1821. He pursued his earlier studies at Antwerp under Baron Wappers. After a brief period spent in portrait painting in England, he resided for three years in Paris, where he produced works intensely dramatic in feeling, but somber in coloring. A visit to Italy about 1845 led him to seek greater variety and richness of coloring, and its results were apparent in his subsequent works. In 1850 he was a contributor of verse, prose and design to the pre-Raphaelite paper, "The Germ." (See ROSSETTI, *Britannica*, Vol. XX, pp. 858-59). He is known to some extent as a book-illustrator, and among the examples of stained glass which he has designed may be mentioned the windows in St. Oswald's Church, Durham.

BROWN, OLIVER MADDOX, son of the preceding, author and artist, born at Finchley, near London, England, Jan. 20, 1855, died Nov. 5, 1874. At the age of 12 years he executed a water-color picture, *Margaret of Anjou and the Robber*, of very considerable merit; two years later his *Chiron* was shown at the Dudley Exhibition; in 1870 his equestrian *Exercise* found a place in the Royal Academy; and already several of his designs had been engraved. In 1871-72 he wrote his first novel, *The Black Swan*, a marvelous production for a lad. The tales of *The Dvale Bluth* and *Hebditch's Legacy*, with some minor pieces, were incomplete at the time of his early death.

BROWN, GEORGE, Canadian journalist, born in Edinburgh, Scotland, Nov. 29, 1818, died in Toronto, May 9, 1880. He assisted his father in the printing business in Toronto, then came to New York, where he published the "British Colonist" for his father. He returned to Canada, and in 1844 established "The Globe." Twenty years later, having made this a successful daily paper, he started the "Canadian Farmer." In 1852 he entered the Canadian parliament, and soon became a powerful leader. In August, 1858, he was called to assist in forming a government, and the Brown-Dorion administration came into being; but on account of dissatisfaction in the assembly, Brown and his colleagues resigned. In the movement for constitutional changes, which was begun in 1864, he was leader of the reform section, and the report of the committee which he formed was carried out in 1869. He was twice offered the honor of knighthood; sat in many public conferences; was sent as delegate to London in 1865, and to Washington in 1874 to assist in formulating a commercial treaty. He declined the lieutenant-governorship of Ontario in 1875. Mr.

Brown's death resulted from his being shot in the leg by a discharged employee. In Queen's Park, Toronto, there is a statue which was erected to his memory in 1884.

BROWN, SIR GEORGE, British general, G. C. B., born at Linkwood, near Elgin, Scotland, in 1790, died at Linkwood, Aug. 27, 1865. He entered the army in 1806; served through the Peninsular campaign (1808-13), and in 1814 joined Ross's expedition against the United States. In the Crimean war (1854-55), he commanded the Light Division, and was severely wounded at Inkerman. In 1860 he became commander-in-chief in Ireland.

BROWN, GEORGE LORING, painter, born in Boston, Mass., Feb. 2, 1814, died in Malden, Mass., June 25, 1889. He studied art in Boston under Washington Allston, and in Paris with Eugene Isabey, and became noted as a landscape painter. Some of his best pictures are: *The Bay of New York*, *Niagara by Moonlight*, *Venice*, and *Doge's Palace at Sunrise*.

BROWN, GOULD, grammarian, born in Providence, R. I., March 7, 1791, died in Lynn, Mass., March 31, 1857. He was of Quaker descent, taught school in Rhode Island and in a Friend's school in Dutchess county, N. Y., and in 1813 removed to New York city, where he conducted an academy for over twenty years. He published grammars which were great improvements on those previously in use, and were authorities for years. Their titles were: *Institutes of English Grammar*, *First Lines of English Grammar*, *A Grammar of English Grammars*.

BROWN, HARVEY, soldier, born in Rahway, N. J., in 1795, died in Clifton, N. Y., March 31, 1874. In 1818 he graduated at the United States Military Academy, and served successively in the Black Hawk expedition, in Florida in 1836; in the campaign against the Seminoles; on the Canadian border, and again on the Mexican border. He was ordered against the Seminoles in 1852-53 and again in 1854-56; was commander of the Washington defenses until April 4, 1861; was ordered to Fort Pickens, Florida, 1861-62, and his last important services were rendered in New York city, July 12-16, 1863, during the draft riots. For this he was breveted major-general, U. S. A. In the same year he was retired from active service, having had his name on the Army Register for more than forty-five years.

BROWN, HENRY ARMITT, orator, born in Philadelphia, Pa., Dec. 1, 1844, died there Aug. 21, 1879. He was a Yale graduate, studied law in Columbia, traveled in Europe and the East, and on his return became famous as an orator on historical, social or political occasions.

BROWN, HENRY KIRKE, sculptor, born in Leyden, Mass., Feb. 24, 1814, died in Newburg, N. Y., July 10, 1886. At an early age he began to paint, and at the age of seventeen studied with Chester Harding, a portrait-painter, Boston. Removing to Albany, he made portrait-busts of Dr. Wm. B. Sprague, Erastus Corning and others. He spent four years in Europe, and in 1846 returned to New York, where, assisted by skilled foreign workmen, he attempted the first bronze casting ever done in America. He constructed the altar-piece for the Church of the Annunciation in New York, and modeled portrait busts of his friends, Dr. Willard Parker and William Cullen Bryant. He made the statue of De Witt Clinton for Greenwood Cemetery. For several years he lived in South Carolina, where he was engaged on an ideal group to adorn the Columbia State House. Unfortunately, Sherman's army destroyed this work of art before it had been completed. The war compelled Mr. Brown to go North; for, although he had made many warm Southern friends and was



urged to espouse the Confederate cause, his sympathies were with the North. He served on the Sanitary Commission. Among the works executed by this artist are: *Dr. George W. Bethune*, in Parker Institute, Brooklyn; *Lincoln*, in Union Square, New York; *Equestrian Statue of General Scott*; *General Philip Kearney*; *Richard Stockton*, and *An Equestrian Statue of General Nathaniel Greene*. Most of Mr. Brown's works are owned by public or national associations. His equestrian statues are ranked as his best.

BROWN, JACOB, soldier, born in Bucks county, Pa., May 9, 1775, died in Washington, D. C., Feb. 24, 1828. In early life he engaged in surveying, teaching, writing for newspapers, studying law and in military service. He fought at Ogdensburg Oct. 4, 1812; at Sackett's Harbor May 29, 1813; at Chippewa July 5, 1814; at Lundy's Lane, July 25, 1814, and at Fort Erie, Sept. 17, 1814. He was very successful in leading his troops, and it was said of him, "No enterprise that he undertook ever failed." Congress awarded him thanks and a gold medal, and he succeeded to the chief command of the United States army, March 10, 1821.

BROWN, JOHN, grandson of Chad Brown, born in Providence, R. I., Jan. 27, 1736, died there, Sept. 20, 1803. He was a wealthy merchant, and his were said to be the first ships trading between Rhode Island and the East. Anticipating the American Revolution, he had his ships from the East freighted with gunpowder, which went to supply the soldiers of Cambridge. The corner-stone of the first building of Brown University was laid by him. He was one of the largest contributors to that institution, and for twenty years its treasurer.

BROWN, JOHN CALVIN, soldier, born in Giles county, Tenn., Jan. 6, 1827, died in Macon county, Tenn., Aug. 17, 1889. He graduated at Jackson College, Tenn., 1846, and soon thereafter began the study and practice of law, in which he succeeded. His health becoming delicate, he traveled extensively in Europe, Asia and Africa, and, having recovered his health, returned to America and resumed his profession in his native county. He was elector of his Congressional district on the Whig ticket in 1860. He entered the military service of the State of Tennessee in 1861 as captain of a company; was soon afterward elected colonel of a regiment, and was transferred from the military service of Tennessee to that of the Confederate States, in which he served with increasing distinction till the close of the civil war in 1865—having been successively promoted to the grades of brigadier and major-general. He was captured at Fort Donelson, Tenn., in February, 1862, when the Confederate forces at that place surrendered to Gen. Grant; was a prisoner of war at Fort Warren, Mass., for about seven months, when he was exchanged and reentered the Confederate army with his command at Chattanooga, Tenn., in September, 1862, and was with Gen. Bragg on his Kentucky campaign; participated in the battles of Perryville, Ky.; Murfreesboro or Stone River, Chickamauga, Missionary Ridge, Kennesaw Mountain, in the battles near Atlanta, Ga.; at Jonesboro, Ga., and at Franklin, Tenn. At the latter battle, which was one of the fiercest and bloodiest of the war, he commanded a division of Tennesseans (formerly Cheat-ham's division), and when the advanced and inferior line of the Federal forces had been stormed and routed, and had sought refuge in their main line, strongly intrenched, and near a half mile to the rear, he shouted to his command to "go into the works with them." His order was obeyed and a portion of his division, under command of Brigadier-General Geo. W. Gordon, were the only Con-

federate troops that made a breach in the main line of the Federal works. But the Federals being opportunely reinforced at that point, the Confederates were driven back to and on the opposite side of the main line of works—Gordon being captured and the battle proving a disaster to the Confederate arms.

After the war, Gen. Brown successfully resumed the practice of the legal profession. He was elected president of the Constitutional Convention of the State in 1870, in which capacity he served with eminent satisfaction to the people, and was twice elected governor of Tennessee, serving as such from 1871 to 1875. About this time, retiring from public life, he became vice-president of the Texas Pacific Railroad. He subsequently became solicitor for Jay Gould's western system of railroads, and more recently became receiver of the Missouri Pacific Railroad, the vast and varied interests of which he managed with signal success and efficiency. He was a well-balanced, many-sided, potential man, with a vigorous, well-disciplined and practical, yet cultivated, intellect; success crowned his varied efforts and enterprises with remarkable uniformity.

BROWN, JOHN CARTER, merchant, philanthropist and book collector, born in Providence, R. I., Aug. 23, 1797, died there June 10, 1874. He was a son of the merchant-philanthropist, Nicholas Brown. In 1816 he graduated at Brown University, and entered the counting-room of his father. He gathered a fine library, which numbered 6,235 volumes, among which were 48 containing the journals and letters of the North American Jesuits. He was a liberal patron of Brown University.

BROWN, JOHN PORTER, Oriental scholar, born in Chillicothe, Ohio, Aug. 17, 1814, died in Constantinople, Turkey, April 23, 1872. He was in the naval service till his uncle, David Porter, was sent as minister to the Porte in 1832, when he accompanied him abroad, and, giving his attention to the study of Oriental literature, achieved a high reputation. In various capacities he spent forty years in Turkey, during the last fourteen of which he was secretary of legation. He frequently contributed to American magazines, translated Ahmed Ben Hemden's *Turkish Evening Entertainments*; *Constantine's Ancient and Modern Constantinople*, and wrote *Dervishes*, or *Oriental Spiritualism*.

BROWN, JOSEPH EMERSON, statesman, born in Pickens county, S. C., April 15, 1821. He graduated at the Yale law-school, served as State senator and as presidential elector, and was governor in 1857, 1859, 1861 and 1863. He espoused the Southern cause when the civil war opened, seized Forts Pulaski and Jackson, and afterward the United States arsenal at Savannah; this was done early in the first months of the war. He raised an army of 10,000 men, consisting largely of persons usually exempt from military service. When Jefferson Davis called for this force to fight outside the State, Governor Brown would not send them, believing such an order unconstitutional. At the close of the war he was imprisoned for a time, but in 1866 visited Washington and became convinced that the best course for his State was to submit to the reconstruction measures. This policy made him unpopular for a time, and he voted with the Republicans when Grant was elected President. The tide of popularity turned, and ex-Governor Brown has represented his State in the United States Senate from 1880 to 1891, being elected by the Democrats.

BROWN, NICHOLAS, philanthropist, great grandson of Chad Brown, born in Providence, R. I., April 14, 1769, died there, Sept. 27, 1841. He was a graduate of Rhode Island College, and for many years

a member of the State legislature. Rhode Island College was renamed in his honor. He gave nearly \$100,000 to Brown University. Hope College and Manning Hall were erected by him, the former being named for his sister, Mrs. Hope Ives. For 50 years he was officially connected with the college. He was a liberal benefactor of other literary or charitable institutions.

BROWN, OLYMPIA, lecturer, born in Prairie Ronde, Mich., Jan. 5, 1835. She was educated at Mount Holyoke Female Seminary and at Antioch College, Yellow Springs, Ohio. She studied theology at the Universalist school at Canton, N. Y., and in 1864 was installed pastor of a church in Weymouth, Mass. She has since been pastor of Western churches, has lectured, and is president of the Wisconsin Woman Suffrage Association. She is married to Henry Willis.

BROWN, SAMUEL, physician, born in Rockbridge county, Va., Jan. 30, 1769, died in Alabama, Jan. 12, 1830. He graduated at Dickinson College, and studied medicine with Dr. Rush in Philadelphia. For six years he was professor of medicine in Transylvania University, Lexington, Ky., and he afterwards assisted in starting a medical school in that city. Dr. Brown had a large practice, yet found time to invent various industrial and agricultural improvements; the clarification of ginseng was one of these. He was founder of the first American medical association.

BROWN, SIR WILLIAM, founder of the Liverpool Free Library, born at Ballymena, county Antrim, Ireland, in 1784, died March 3, 1864. In 1809 he established at Liverpool a branch of his father's linen business, and laid the foundation of one of the largest mercantile firms in the world. He took a prominent part in local and public affairs, being especially interested in the promotion of education among the people. In 1846 he was elected member of Parliament for South Lancashire, and was thrice afterwards reelected. In 1857, at a cost to himself of £40,000, he founded the Free Public Library of Liverpool, and in 1859 he raised a corps of volunteer artillery. He was made a baronet in 1863.

BROWN, MOUNT, in the Rocky Mountains, near the source of the Columbia River, and on the borders of British Columbia and Alberta. It is 16,000 feet high.

BROWNE, EDWARD HAROLD, English divine, born March 6, 1811, at Morton House, Bucks, and educated at Eton and at Emanuel College, Cambridge, where he became a Fellow and tutor. He was made professor of Hebrew at Lampeter in 1841, and Norrisian Professor of Divinity at Cambridge in 1854; was consecrated Bishop of Ely in 1864, and translated to Winchester in 1873. His works comprise several volumes of sermons, a book on the Pentateuch, and the well-known *Exposition of the Thirty-nine Articles* (1850; 12th edition, 1882).

BROWNE, HABLOT KNIGHT, artist, the "phiz" of many clever and humorous book illustrations, born at Kennington, Surrey, England, June 15, 1815, died at West Brighton, July 8, 1882. He early showed a taste for drawing, and was apprenticed to Finden; but, disliking the laborious methods of line-engraving, he took to the freer processes of etching and water-color painting, and in 1833 gained a medal from the Society of Arts for an etching of *John Gilpin*. In 1836 Browne succeeded Seymour and R. W. Buss as illustrators of Dickens's *Pickwick*, competing successfully against Thackeray for the work; and he soon enjoyed a reputation which was continued and preserved by his designs for *Nicholas Nickleby*, *Master Humphrey's Clock*, *Martin Chuzzlewit*, *David Copperfield*, and other of Dick-

ens's works. He also illustrated many of Lever's and several of Ainsworth's novels.

BROWNELL, HENRY HOWARD, author, born in Providence, R. I., Feb. 6, 1820, died in East Hartford, Conn., Oct. 31, 1872. He studied law, but applied himself to teaching in Hartford. During the early part of the civil war he versified Farragut's "General Orders" to his fleet in the attack on New Orleans. The bright little poem came to Farragut's notice, and the poet and commander met each other. Through the influence of the latter, Brownell's desire to witness a naval battle was granted, for he was appointed acting ensign on the flag-ship *Hartford*. He was present at the battle of Mobile bay. *The River Fight* and *The Bay Fight* are his best poems, and are warmly praised by Oliver Wendell Holmes. Brownell published a volume of poems, and a few other works.

BROWNELL, THOMAS CHURCH, Bishop of the Protestant Episcopal church, born in Westport, Mass., Oct. 19, 1779, died in Hartford, Conn., Jan. 13, 1865. He studied at Brown, graduated at Union as valedictorian of his class in 1804, was appointed Greek and Latin tutor, professor of Logic and Belles-lettres in 1806; lectured on Chemistry, and in 1814 was elected professor of Rhetoric and Chemistry. A little time previous to this his religious views had changed; he abandoned the Calvinistic theory, and began the study of theology with the intention of becoming an Episcopal clergyman. He was ordained deacon in 1816, and two years later elected assistant minister of Trinity Church, New York. In 1819 he was consecrated bishop. He labored earnestly for a church college in Connecticut, and in 1823 the charter for Washington (now Trinity) College was granted. He was its first president, but continued in office only a year, as the duties of his episcopate required his whole time. He organized churches in the South, published sermons and religious books, and during the 45 years of his episcopate ordained 179 deacons and confirmed 15,000 people.

BROWNIAN MOVEMENT, also and originally called *Brunonian Motion* or *Movement*, an incessant vibratory motion frequently observed in very small, solid particles when suspended in water, as when gamboge is rubbed up in water, and first described by Robert Brown (1757-1831), a Scotch botanist and agriculturist. The same movements are also manifested by microscopic germs, but the Brownian movement is entirely physical, not vital. Its cause is somewhat obscure, but may perhaps be explained by the fact that the particles being in delicate equilibrium are extremely sensitive to change of temperature.

BROWNIE, kind of domestic spirit in the folklore of Scotland. See *Britannica*, Vol. II, p. 204.

BROWNING, ROBERT, English poet, born at Camberwell, May 7, 1812, died Dec. 12, 1889. He received a local education, attended lectures at University College, and then traveled abroad. While still a youth he acquired the triple reputation of poet, musician and modeler. *Pauline*, a dramatic poem, written at the age of 19, was published in 1833. Two years later appeared his *Paracelsus*, which revealed a greater force. In 1837 he wrote his first tragedy, *Strafford*, but this and subsequent plays were not of the usual popular stage order. *Sordello*, which for its involutions of thought, has given more trouble to Browning's readers than any other of his works, appeared in 1840. A series of plays, tragedies and dramatic lyrics was issued under the collective title of *Bells and Pomegranates* (1841-46), containing some poems which became and still remain the most popular of all Browning's writings.



In 1846 Browning married Elizabeth Barrett, herself a gifted poetess, and with her went to Florence, where they resided for 15 years. In 1850 Browning published *Christmas Eve and Easter Day*, and in 1855 *Men and Women*. After the death of his wife, in 1861, the poet settled permanently in London with his only son, Robert Barrett, born in 1849. His generally accepted master-piece, *The Ring and the Book*, was published in 1869. *Hervé Riel*, a poem upon a French sailor hero, was published in 1871, the proceeds being given to the fund for the relief of Paris. From 1871 onward, works by Browning appeared in rapid succession.

The "Browning Society" of London was established in 1881 for the purpose of promoting the study and influence of the poet's works, and the example of London has been followed by many other large centers in Great Britain, the colonies, and the United States. Browning is the most subtle and intellectual of contemporary English poets; his lyrical faculty, dramatic energy, and power of psychological analysis have rarely been equaled at any period; but his style is too frequently obscure and difficult; his versification hard and rugged, and his rhymes forced.

**BROWNLOW, WILLIAM GANNAWAY**, born in Wythe county, Va., Aug. 29, 1805, died in Knoxville, Tenn., April 29, 1877. He was an itinerant Methodist preacher, who in 1828 began to interest himself in politics. He soon became known as the "Fighting Parson." He was opposed to nullification, in favor of slavery, but opposed to secession. He was editor of the "Knoxville Whig" from 1838 to 1861, at which last date his paper was suppressed. He was persuaded to leave the town, for he would not take the oath of allegiance to the Confederate government, but on his return was treacherously arrested and imprisoned. Judah P. Benjamin regarded him with distrust, and advised his being set at liberty. Brownlow was put inside Union lines, and then made a trip North, lecturing in prominent cities to large audiences. In 1864 he returned to Tennessee, and the following year was elected governor. He served a second term. The Ku-Klux trouble broke out at this time, and the governor was obliged to proclaim martial law in nine counties. He was elected to the United States Senate in 1869, and, at the close of his term returned to Knoxville, purchased a controlling interest in his old newspaper, and edited it till the time of his death.

**BROWN-SÉQUARD, CHARLES ÉDOUARD**, physiologist and physician, born in Mauritius in 1818, his father being a sea captain from Philadelphia, Pa., who married on the island a lady named Séquard. The son studied at Paris, and graduated M. D. in 1846. He has since received numerous prizes for the results of valuable experiments in various departments of physiological science, principally connected with the blood, the brain, and the nervous system. He has edited several medical journals, and held the chair of medicine in the Paris School of Medicine, and since 1878 the chair of Experimental Medicine in the College of France; and again in the French Academy of Sciences. He occupied the chair of physiology in Harvard College from 1864 till 1869. He also practiced medicine in New York city from 1873 to 1878.

**BROWNSON, ORESTES AUGUSTUS**, born in Stockbridge, Vt., Sept. 16, 1803, died in Detroit, Mich., April 17, 1876. In 1822 he united with the Presbyterian church at Ballston, N. Y., but his religious views changed, and three years later he became a Universalist, preached in New York and Vermont, and conducted successively the "Gospel Advocate" and the "Philanthropist," organs of Universalism. In 1828

attracted by the views of Robert Owen, he helped to form the working-men's party. The writings of Dr. Channing next influenced him to study Unitarianism, and he became a preacher in that denomination in 1832. He was a popular Democratic leader, and in Massachusetts a favorite stump-speaker; he was one of the founders of the "Locofoco" party in New York, and a supporter of Van Buren. By writing articles on eclectic philosophy he gained the reputation of being a philosopher; he started the "Boston Quarterly Review," which was afterwards incorporated with the "Democratic Review" of New York. In 1844 he joined the Roman Catholic church. Dr. Brownson advocated his ideas on politics and religion in the paper published in New York as "Brownson's Quarterly Review," still the leading Roman Catholic periodical of the United States. His orthodoxy was questioned, but Cardinal Franzelin pronounced his published works undeserving of censure. His last years were spent at the home of his son in Detroit. The collected edition of his works is published in nineteen volumes, among these being *Essays and Reviews*; *The Spirit Rapper*; *An Autobiography*; *Charles Elwood, or the Infidel Converted*; and *Conversations on Liberalism and the Church*. In politics as in religion, Dr. Brownson was unstable and liable to a change of views. As a stump-speaker and as a writer he was vigorous and acrimonious.

**BROWN SPAR**, a name often given by mineralogists to certain varieties of dolomite, or magnesian limestone, distinguished by a brownish or reddish color, and a pearly luster, on account of which they are also sometimes called *pearl spar*.

**BROWNSVILLE**, a town of Pennsylvania, situated on the east bank of the Monongahela, about 30 miles south of Pittsburgh. It contains extensive manufactories of glass, iron, machinery, flour, steam-engines, and lumber. Coal is mined in the vicinity.

**BROWNSVILLE**, a town of Tennessee, county-seat of Haywood county. It is situated in a fertile cotton-growing region, about five miles north of the Hatchie River and 25 miles west of Jackson. It is the seat of four colleges, and an important shipping point for cotton.

**BROWNSVILLE**, a city of Texas, county-seat of Cameron county, and a port of entry. It is situated on the Rio Grande, opposite Matamoros, Mexico. It is historical as the scene of two engagements, the first being an unsuccessful attack by the Mexicans in May, 1846; the second being the capture of the city by General Banks in November, 1863. It contains a custom-house, and is the seat of a Roman Catholic college and convent.

**BROWN UNIVERSITY**. See COLLEGES, in these Revisions and Additions.

**BROWNVILLE**, one of the oldest towns of Nebraska, county-seat of Nemaha county. It is pleasantly situated on the Missouri River, about 120 miles, by water, below Omaha. It contains several mills and factories, and has a flourishing local and river trade.

**BROWNWOOD**, a city of Texas, county-seat of Brown county. It is situated on the Pecan River, near the foot of the Comanche Mountain, about 75 miles northwest of Lampasas. The surrounding country is rich in pasture, and in the vicinity are valuable groves of oak, ash, elm, and other timber.

**BROXBURN**, a mining and manufacturing village of Scotland, situated on the Union Canal, 12 miles west of Edinburgh. It is chiefly notable for its shale-oil works. See *Britannica*, Vol. XVIII, p. 240. Those of the Broxburn Oil Company, built in 1878, employ about 1,600 men, and turn out annually about 10,000,000 gallons of crude paraffine oil from

the shale mined in the neighborhood, besides paraffine candles and wax, sulphate of ammonia, and other products. Population, 3, 210.

BRUCE, ALEXANDER, a Scotch clergyman and educator, born in Perthshire in 1831. He became professor of New Testament exegesis in the Free Church College at Glasgow in 1875. His literary works are chiefly theological.

BRUCE, BLANCHE K., born in Prince Edward county, Va., March 1, 1841. He is an African, was born in slavery and continued in servitude till the civil war, when his young master enlisted in the Confederate Army. Young Bruce had received some education from his master's tutor, and he taught school in Hannibal, Mo., and then entered Oberlin College. After the war he became a Mississippi planter, was elected to several county and State offices, and in 1875 was elected on the Republican ticket to the United States Senate. Since 1868 he has been a member of every Republican convention. In 1881 he was appointed by President Garfield to the office of Register of the Treasury. Senator Bruce is highly esteemed as a platform lecturer as well as politician.

BRUCE, GEORGE, typefounder, born in Edinburgh, Scotland, July 5, 1781, died in New York city, July 6, 1866. Coming to New York at the age of 14 he was apprenticed to a book-binder, and with his brother David afterwards drifted to Philadelphia, Albany, then back to New York. They had had some printing-house experience, and in 1806 opened a book-printing office. Three years later they were able to move to a better locality. In 1812 the secret of stereotyping was learned by David during a visit to England, and the brothers henceforth employed the process in their work, finding it necessary to cast their own type, and in various other ways overcome obstacles. The New Testament in bourgeois (1814) was their first stereotyped work. In 1816 they abandoned the printing business and became exclusively typefounders, erecting in 1818, on Chambers street, the present foundry. George Bruce introduced many improvements in types, and, assisted by his nephew David, his brother having retired from the business, invented the only successful type-casting machine. Mr. Bruce was connected with various industrial societies, and was noted for integrity and benevolence.

BRUCE, JOHN COLLINGWOOD, antiquary, born at Newcastle in 1805, graduated at Glasgow in 1826, and was trained for the Presbyterian ministry, but devoted himself to teaching. He was moderator of the English Presbyterian Church in 1881. His works include *The Roman Wall* (1851; third edition, 1866); *The Bayeux Tapestry Elucidated* (1856); *Lapidarium Septentrionale* (1875), an account of all the Roman monuments in the North of England; and a *Hand-book to the Roman Wall* (1863; third edition, 1885).

BRUCEA, a genus of *Terebinthaceae*, named after J. Bruce (1730-94), the African explorer. *Brucea antidysenterica* or *ferruginea* is an Abyssinian shrub, the leaves of which are said to be tonic, astringent, and useful in dysentery. Those of *Brucea sumatrana*, a native of the Indian Archipelago, China, etc., possess the same medicinal properties. They are intensely bitter, their properties resembling those of quassia. The Abyssinian species acquired a factitious importance in the beginning of the 19th century, from a mistaken belief that it produced the dangerous False Angostura Bark, and in this belief the name *Brucei* was given to an alkaloid really produced by *Strychnos nux-vomica*.

BRUCH, MAX, a German composer, born at Cologne in 1838. He is the composer of the famous *Loreley*. Of his larger works his *Scenes from the Frithiof Saga*, and *Scenes from the Odyssey*, are con-

spicuous for masterly treatment and strong contrast of vocal and orchestral tones.

BRUCIN, a vegetable alkaloid present in *Strychnos nux-vomica*, and St. Ignatius' bean. Its action on the animal economy is similar to that of strychnine, but much less powerful, and on this account it is seldom employed. It is capable of being converted into strychnine by heating it with five times its weight of dilute nitric acid, carbonic acid gas being given off.

BRUGG, a town in the Swiss canton of Aargau, situated on the right bank of the Aar, 36 miles southeast of Basel by rail. Near it is the site of *Vindonissa*, the chief Roman station in Helvetia; and it was also the cradle of the house of Hapsburg, whose ruined castle, founded in 1020, crowns a wooded height two miles from the village. Nearer is the abbey of Königsfelden (1310, converted in 1872 into an asylum), in the vaults beneath which are interred many of the members of the Austrian royal family. Zimmermann was a native of Brugg. Population, 1,435.

BRÜGSCH, HEINRICH KARL, an eminent Egyptologist, born at Berlin, Feb. 18, 1827. At the age of 21 he published a Latin treatise on the demotic writing, which gained him the favor of King Frederick William IV, by whose aid he was enabled to visit the museums of Paris, London, Turin, and Leyden. He visited Egypt in 1853, taking part in the excavations of the French archaeologist, Mariette, at Memphis. He was called to the chair of Oriental Languages at Göttingen, but returned to Egypt in 1870, on the invitation of the viceroy, to take charge of the School of Egyptology at Cairo with the rank of Bey, receiving the title of Pasha from the viceroy in 1881. In 1884 he accompanied the German embassy to Persia. Brugsch's works on Egyptology are numerous and valuable. Of these the chief are: *Geographische Inschriften altägyptischer Denkmäler* (three volumes, 1857-60); *Geschichte Egyptens unter den Pharaonen* (1877; English translation, 1879); *Hieroglyphisch-demotisches Wörterbuch* (seven volumes, 1867-82); *Grammaire Hieroglyphique à l'Usage des Etudiants* (1872); *Dictionnaire Geographique de l'Ancienne Egypte* (1877-80); *Thesaurus Inscriptionum Egyptiacarum* (1882); and *Religion und Mythologie der alten Egypter* (1884).

BRÜHL, a town of Rhenish Prussia, eight miles southwest of Cologne by rail. It has a fine castle, erected in the early part of the 18th century by the Elector Clement Augustus of Bavaria, and restored by the king of Prussia in 1842. After his banishment from France in 1651, Cardinal Mazarin took up his residence in Brühl. Population, 4,030.

BRÜHL, HEINRICH, COUNT VON, prime minister of Augustus III, king of Poland and elector of Saxony, memorable among unworthy ministers and venal statesmen, born at Weissenfels in 1700, died Oct. 28, 1763. In early life he entered as a page into the service of the duchess of Saxe-Weissenfels. His winning address and tact gained for him rapid promotion through several offices of state, until in 1746 he became prime minister to Augustus III (see Britannica, Vol. XXI, p. 355). While humoring the whims of his unworthy master he contrived to enrich himself and to accumulate honors and titles, maintaining the most splendid establishment in the kingdom. The effect of this robbery of the national finances was felt at the outbreak of the Seven Years' War, when the country could furnish only 17,000 men to oppose Frederick of Prussia, who surprised and captured the whole Saxon army in its camp at Pirna. Augustus and Brühl fled to Warsaw, returning to Dresden when peace was concluded.

BRUMAIRE (French, "foggy month"), a division of the year in the Republican calendar of France.



It includes the time from Oct. 22 to Nov. 20. The celebrated 18th Brumaire, which witnessed the overthrow of the Directory and the establishment of the sway of Napoleon, corresponds with Nov. 9, 1799, of the Gregorian calendar.

BRUMMELL, GEORGE BRYAN (1778-1840), better known as "Beau Brummell," born in London, June 7, 1778, the son of Lord North's private secretary. At Eton, and during a brief sojourn at Oxford, he was less distinguished for studiousness than for the exquisiteness of his dress and manners, and, after four years in the army, having come into a fortune of £30,000, he entered society as an arbiter of elegancies, in which vocation he proved a brilliant success. His wit proved too fine for his 20 years' patron and admirer, the Prince Regent, resulting in a quarrel in 1813. Three years later Brummell was forced by gambling debts to flee to Calais, where he continued his reckless course for 14 years. From 1830 to 1832 he held a sinecure consulate at Caen. He subsequently became imbecile, and died in the pauper lunatic asylum of that city, March 30, 1840.

BRUNAL, an independent Mohammedan territory in the northwest of Borneo, whose sultan was formerly overlord of the whole island. Area, about 18,000 square miles; population estimated at about 200,000, divided into trade castes. The capital, Bruani, situated on a river of the same name, is a squalid town, built on piles. It has 30,000 to 35,000 inhabitants, who carry on considerable trade with Singapore and other ports.

BRUNANBURGH, the scene in 937 of a bloody battle, in which Athelstan defeated an allied army of Welsh, Scots, and Danes (see *Britannica*, Vol. VIII, p. 285; Vol. XVIII, p. 570; Vol. XXI, p. 479). The exact location of the place is not known. Of the Anglo-Saxon poem on the victory, preserved in the Anglo-Saxon *Chronicle*, there is a spirited version by Lord Tennyson.

BRUNÉ, GUILLAUME MARIE ANNE (1768-1815), a French marshal of the First Empire, born at Brives-la-Gaillarde, March 13, 1763. At first a Paris bookseller, he became a member of the Cordeliers' Club, and a friend of Danton. In 1792 he was sent as civil commissary to Belgium, but he soon entered the army, fought in the Vendean war and in Italy under Massena, and after Rivoli was made general of division. Sent by the Directory to Switzerland in 1798, he executed his orders with brilliant success (see *Britannica*, Vol. XXII, p. 793). In 1799 he was made commander of the army of Holland, where he achieved the reputation of being one of the best generals of his age. In 1803 he was ambassador to Turkey, and in 1804 obtained the dignity of marshal. He became governor-general of the Hanseatic towns, but was recalled by Napoleon. After the return from Elba he joined the Emperor, was made a peer, but, like many better men, had his prospects blasted by Waterloo. He was brutally murdered by an infuriated mob at Avignon, Aug. 2, 1815.

BRUNIG, a Swiss pass (3,396 feet), forming the shortest and easiest route between the "Forest Cantons" and the Bernese Oberland. A road was formed in 1857-62, and in 1888 a Brunig branch of the Berne-Lucerne railway was opened.

BRUNI ISLAND (North and South) lies off the east coast of Tasmania, from which it is separated by D'Entrecasteaux Channel. It has a length of 32 miles, a varying breadth of one to 11 miles, and an area of 160 square miles. Coal is here mined.

BRUNNOW, PHILIPP, COUNT VON (1797-1875), diplomatist, born at Dresden in 1797, and entered the Russian service in 1818. Sent on a special mission to London in 1839, he was accredited as

permanent ambassador there in the following spring. In this capacity he soon acquired distinction as a diplomatist. On the outbreak of the war in 1854 he retired from London, and represented Russia at Frankfurt. He was afterwards appointed to the court of Prussia, but in 1858 he returned to his old place in London, where he represented Russia at the conferences in 1864 and 1871. He was raised to the rank of count in 1871, and in 1874 retired to Darmstadt, where he died April 12, 1875.

BRUNO THE GREAT, archbishop of Cologne, one of the most eminent men of his time, born about 925, died at Rheims, Oct. 11, 965. He was the third son of Henry the Fowler. He became archbishop of Cologne and chancellor of the empire under his brother Otto I, and afterwards, as a reward for his service, duke of Lorraine. Distinguished alike for piety and learning, he strove to reform the monasteries and advance the love of learning among the clergy.

BRUNSWICK, a duchy of the German empire. Area, 1,441 square miles; population, 372,580; capital Brunswick, with a population of 85,174 at the census of Dec. 5, 1885. For early history and institutions, see *Britannica*, Vol. III, pp. 401-3.

The budget is voted by the chamber for the period of two years, but each year separate. For the year 1888 the revenue and expenditure of the state were made to balance at 11,175,000 marks, and of the domains at 2,445,000 marks. Not included in the budget estimates is the civil list of the duke—1,125,000 marks in 1888. The public debt of the duchy, without regard to a premium-loan repayable in rates of 1,200,000 marks yearly till 1924, at the commencement of 1888 was 28,971,000 marks, four-fifths of which were contracted for the establishment of railways; the productive capital of the state was at the same time 42,490,000 marks, besides an annuity of 2,625,000 marks till 1934, stipulated at the sale of the railways of the state. In 1888 there were 255 miles of railway.

The last duke of Brunswick, Wilhelm I (born April 25, 1806; crowned April 25, 1831), died Oct. 18, 1884. With him the ducal house of Brunswick became extinct, his son Duke Charles having died in 1873 without issue.

The heir to Brunswick, the duke of Cumberland, was excluded, owing to his refusal to give up claim to the throne of Hanover. The duke of Cambridge (cousin to Queen Victoria, and commander-in-chief of the British Army), the nearer *agnate* heir, was also not accepted owing to his refusal to give up his English appointments and residence.

The Brunswick Regency law of Feb. 16, 1879, enacts that in case the legitimate heir to the Brunswick throne be absent or prevented from assuming the government, a council of regency, consisting of the ministers of state and the presidents of the Landtag and of the Supreme Court, should carry on the government, while the German Emperor should assume command of the military forces in the duchy. If the rightful heir, after the space of a year, is unable to claim the throne, the Brunswick Landtag shall elect a regent from the non-reigning members of German reigning families.

Under this provision of the constitution, Prince Albrecht, son of the late Prince Albrecht, of Prussia, was unanimously elected regent of Brunswick by the Diet, Oct. 21, 1885. He is the son of the late Prince Albrecht, brother of the late William I, King of Prussia and Emperor of Germany. He is, therefore, second cousin to the present Emperor, William II. He was born May 8, 1837, and married April 19, 1873, to Princess Marie, daughter of Duke Ernst of Saxe-Altenburg. When

chosen regent he was commanding-general of the tenth corps d'armée.

**BRUNSWICK**, a city of Georgia, county-seat of Glynn county, and a port of entry. It is situated on St. Simon's Sound, about 80 miles south of Savannah and 8 miles from the Atlantic Ocean. The harbor is safe and commodious, and the chief industry is the manufacture and export of yellow pine lumber and cyprus staves. There is also a considerable trade in naval stores and cotton.

**BRUNSWICK BLACK**, a varnish employed for coating over coarsely finished iron grates, fenders, etc. It is prepared by melting together asphalt, linseed oil and oil of turpentine. For finer work it has been superseded by Berlin black, a similar composition of finer quality.

**BRUSH, CHARLES FRANCIS**, inventor, born in Euclid, Ohio, March 17, 1849. His early years were spent on a farm, and he attended the Cleveland public schools. Physics, chemistry and engineering were favorite studies, and his leisure was spent in scientific experiments. He graduated at the University of Michigan in 1869, and became analytical chemist in a laboratory of his own, established in Cleveland. In 1875 he built a dynamo machine, which could supply several lamps in one circuit with the right kind and amount of electricity. His next important invention was an electric lamp. In 1876 these inventions were successfully introduced in the United States, and since then he has obtained half a hundred patents, most of which are highly remunerative.

**BRUSH, GEORGE JARVIS**, mineralogist, born in Brooklyn, N. Y., Dec. 15, 1831. While attending a course of lectures on agriculture at Yale, with the intention of becoming a farmer, he became so interested as to extend his stay from six months to two years, meanwhile taking up chemistry and mineralogy. In 1851 he was assistant professor of chemistry in Louisville University, and from 1852-53, chosen for the same work in the University of Virginia. For two years in Germany and in 1857 became professor of mineralogy in Yale. He has for years been prominent in the management of the Sheffield Scientific School of Yale. Professor Brush assisted Prof. J. D. Dana in preparing a *Descriptive Mineralogy*, and has himself published a *Manual of Determinative Mineralogy*. He is a contributor to several journals, and a member of various scientific societies.

**BRUSSELS INTERNATIONAL TREATY**. In the summer of 1890, representatives of England, Germany, France, Italy, Portugal, and the United States agreed upon a treaty, for the suppression of the slave trade in the Central African territory. This treaty was unanimously approved by the United States Senate, Jan. 11, 1892. As passed, the treaty includes a clause substantially declaring that the United States has no desire to take any part in the establishing of territorial boundaries, or in the division of political power among the European Powers now holding territory in Africa. An advantage duty of not more than ten per cent. will be levied by the Congo State upon products imported from the United States, the proceeds to be used in suppressing the slave trade.

**BRUTTIUM**, the country of the Bruttii, anciently the name of the southwest peninsula of Italy.

**BRYAN**, a village of Ohio, county-seat of Williams county, about fifty miles west of Toledo. It is noted for its artesian wells. It is the seat of an academy, and contains important manufactories.

**BRYAN**, a city of Texas, county-seat of Brazos county. It is situated about five miles east of the

Brazos River, and 100 miles northwest of Houston. It is the seat of two colleges, including the State Agricultural and Mechanical College, and of two academies. It is an important shipping-point for cotton, and contains extensive manufactories of cotton, tobacco, soap, oil, flour, chairs and carriages.

**BRYANT, WILLIAM CULLEN**, poet and editor, born in Cummington, Mass., Nov. 3, 1794, died in New York city, June 12, 1878. He was descended from noble Puritan stock, his mother being a descendant of John Alden. When but 13 years old he wrote *The Embargo*, a clever, satirical poem. In 1810 he entered Williams College, where he remained a year, then returned home to study law. It was at this period that he wrote *Thanatopsis*. In 1815, he was admitted to the bar. *The Yellow Violet*, *Inscription for the Entrance to a Wood* and *To a Waterfowl*, were poems written before his 21st year. He was married to Miss Frances Fairchild in 1821, and the poems entitled *O Fairest of the Rural Maids*, *The Future Life* and *The Life That Is*, were among the poems addressed to her. Mr. Bryant practiced law for 10 years, first being located at Plainfield, Mass., and afterward at Great Barrington. In 1825 he removed to New York city, and became assistant editor of the "New York Review and Athenæum Magazine." The paper did not flourish, was soon consolidated with another, and Mr. Bryant became assistant editor of the "Evening Post," and in 1826 editor-in-chief, continuing in this position until his death. Under his control that journal took high rank. It was anti-slavery in tone, a firm supporter of the Union cause, and Democratic in politics. Mr. Bryant visited Europe in 1834, 1845, 1849 and 1857, and published accounts of his travels. He was frequently called upon for public addresses, and his last public appearance was at the unveiling of a bust of Mazzini in Central Park, May 29, 1878. He made an eloquent address, but was overcome by the heat, and on reaching the house of his friend, James Grant Wilson, he fell on the front steps, and lived only two days after the fall. He was a healthy, athletic man, and very fond of walking. In the poetry of Bryant the influence of Pope is plainly seen, and Cowper and Thomson probably also modified his verse.

**BRYCE, JAMES**, an eminent British author and statesman, born at Belfast, Ireland, in 1838, and educated at Glasgow and Oxford. In 1870 he became regius professor of civil law at Oxford University. He has been a member of Parliament since 1880, and was under-secretary for foreign affairs in 1886. He is a representative Liberal, and is noted for his study of the "Eastern question," and his deep interest in the condition of the Armenians. Mr. Bryce's first book was *The Holy Roman Empire*, which established his literary reputation. Among his other works are *Transcaucasia and Ararat*, and various contributions to magazines; but he is best known in this country by *The American Commonwealth*, published in 1889, the result of 20 years' study of the country and its institutions. Mr. Bryce has made four visits to the United States, the last in 1890.

**BRYENNIO**, PHILOTHEOS, D. D., Metropolitan of Nicomedia, born at Constantinople in 1833, studied at the theological school in Chalce, near Byzantium, and after being ordained deacon, attended lectures at Leipsig, Berlin and Munich (1856-61). He was for some years a teacher at Chalce, and presided over the Greek school in Constantinople from 1867 to 1874. He was one of two representatives of the Greek church at the old Catholic conference in Bonn in 1875, and while absent there was chosen Metropolitan of Serre in



Macedonia. In 1877 he was translated to Nicomedia. Author of several minor works, Bryennios is chiefly known as the editor of the Epistles of Clement and of the *Didache*.

BRYN-MAWR COLLEGE, a college for women, situated in the village of Bryn-Mawr, on the Pennsylvania railroad, nine miles northwest of Philadelphia. It was founded by the late Joseph Taylor, M. D., in 1879. See COLLEGES, in these Revisions and Additions.

BRYONY, or BRIONY, the common name of species of *Bryonia*, a genus of *Cucurbitaceæ*, of which the common bryony, *Bryonydioica*, and *Bryony alba*, are both natives of Europe. The former is frequent in the hedge-rows in England, but becomes rarer in the north, and is not indigenous to Scotland. It has cordate palmate leaves, axillary bunches of flowers, and red berries about the size of a pea. *Bryony alba*, which is monœcious, with black berries, is common in Central Europe. The root of both varieties is applied to bruises, was formerly in use as a purgative, and its tincture is still employed in homœopathic and veterinary practice. The roots of bastard bryony, *Vitis (Cissus) sicyoides*, are also acrid and purgative, and are used medicinally in the West Indies; but it is said that the root of *Bryony abyssinica*, when cooked, is eaten without danger. Black bryony, *Tamus communis*, is a plant of a different natural order (*Dioscoreæ*). In habit and distribution it is similar to bryony proper, but it may be readily distinguished by its simple, entire heart-shaped leaves, which are smooth and somewhat glossy. See Britannica, Vol. XXIV, p. 727.

BRYOPHYLLUM, a genus of *Crassulacæ*. *Bryophyllum calycinum*, a succulent shrubby plant, native of the Moluccas, with oblong, crenulated leaves, and large drooping panicles of greenish-yellow flowers, is not infrequent in northern hot-houses, being regarded as an object of interest on account of its producing buds on the edges of the leaves more readily than almost any other plant.

BRYUM, a large and important genus of common mosses. They are small, generally grow in dense patches, and are characterized by fruit borne at the ends of the branches.

BUACHE, PHILIPPE, a French geographer, born in 1700, became in 1729 royal geographer, and in 1730 a member of the Academy of Sciences, died in 1773. He published atlases and geographical works. His nephew, Jean Nicholas Buache (1741-1821), was also a celebrated geographer.

BUACHE, an island off the west coast of Australia, separated from the mainland by Cockburn Sound, which is a valuable harbor for ocean steamers.

BUAZE, an asclepiadaceous shrub found by Livingstone north of the Zambesi, where its twigs are employed as a source of fiber, which much resembles flax.

BUBALIS, an animal belonging to the antelope family, but distinguished from the majority of those animals by its lack of gracefulness. It is clumsy in appearance, a little larger than the average stag, and resembles an ox, except that the head is rather longer. The horns, which form the base to the tip are deeply indented with heavy rings, are long and somewhat circular in form, the tips pointing backward, and the body is covered by a brownish coat with a tuft of black on the end of the tail, and the animal feeds on vegetables. It is found on the banks of the Nile, and numerous pieces of ancient Egyptian architecture and sculpture bear engravings of the B. It is, however, a native of Barbary. The *Camma* of Southern Africa is the antelope most nearly related to it.

BUBO: in medicine, an inflammatory swelling of the glands in the groin; used occasionally also of the armpit.

BÜCCINATOR (Latin, from *buccanare*, "to sound a trumpet"), the trumpeter's muscle; a flat muscle forming the wall of the cheek, so called because when the cheeks are distended with air, the contraction of this muscle forces it out, thus assisting in blowing wind-instruments.

BUCENTAUR, the name of the State barge in which the doges of Venice used to sail out annually, on Ascension-day, amid great festivities, to perform the ceremonial marriage of the State with the Adriatic, in token of perpetual sovereignty. The ceremony was already in use in the 13th century; in 1798 the last "Buceaur," built in 1722-29, was burned by the French, but some portions, spared for their gold work, are still preserved in the arsenal. The word signifies a mythical monster, half bull, half man, such as may originally have been depicted on the vessel.

BUCEPHALUS (Greek, "ox-head"), the name of the favorite charger of Alexander the Great. See Britannica, Vol. I, p. 484; probably also the name of a peculiar breed of horses in Thessaly. The young hero was the first to break in the steed, and thus fulfilled the condition stated by an oracle as necessary for gaining the crown of Macedon.

BUCHAN, DAVID, Arctic explorer, born in 1780, held a lieutenant's commission in the British navy in 1806, and in 1810 was in command of a schooner on the Newfoundland Station. He explored the river Exploit (1811), and penetrated 160 miles into the interior. Promoted commander in 1816, he was two years later appointed to the command of a Polar expedition, at the same time that Ross and Parry started on their voyage in search of a north-west passage. Buchan reached Spitzbergen with the *Dorothea* and *Trent* (see Britannica, Vol. XIX, p. 319); but all attempts to pierce the gigantic icy barrier were in vain. On his return he commanded for a time on the Newfoundland Station, was appointed high-sheriff in 1825, and a few years later sailed on another voyage to northern waters, from which he never returned. His name was removed from the list of living captains in 1839.

BUCHAN, PETER, collector of Scottish ballads, born at Peterhead, Scotland, in 1790, died in London, Sept. 19, 1854. At 24 he published a volume of original verse. He taught himself copper-engraving, learned the art of printing at Stirling, and set up a press at Peterhead in 1816. He afterwards removed to London, but returned after two years to Peterhead. Buchan's *Ancient Ballads and Songs of the North of Scotland* was published at Edinburgh in 1828. A second collection was edited for the Percy Society, in 1845, by J. H. Dixon. Buchan was the author of a number of books, among them *Annals of Peterhead* (1819), and *The Eglinton Tournament and Gentlemen Unmasked* (Glasgow, 1839).

BUCHAN, WILLIAM, physician, born in 1729 at Ancrum, Roxburghshire, Scotland, died in London, Feb. 25, 1805, and studied divinity and medicine in Edinburgh, where he subsequently practiced, and lectured on natural philosophy. His *Domestic Medicine* appeared in 1769. Its success was great and immediate—19 large editions, amounting to 80,000 copies, being sold during his life-time. Other of his works were *Cold Bathing* (1786), *Diet* (1797), and *Offices and Duties of a Mother* (1800). He removed to London in 1778, where he died, and was buried in Westminster Abbey.

BUCHANAN, CLAUDIUS, born at Cambuslang, near Glasgow, Scotland, March 12, 1766, died Feb. 9, 1815. He studied for two years at Glasgow University, and at the University of Cambridge (1791-

95). In 1797 he became chaplain in the East Indian Company's service at Barrackpur, where he studied Hindustani and Persian; in 1799 he removed to Calcutta, and became vice-provost of the College founded by Lord Wellesley at Fort William. He translated the Gospels into Persian and Hindustani, and traveled through southern and western India, but was debarred as a chaplain from directly engaging in missionary work. He returned to England in 1808, where he succeeded, through his sermons and his periodical, "The Star of the East" in exciting such interest as to secure the appointment of an English bishop to Calcutta. His *Christian Researches in India* was published in 1858.

BUCHANAN, ROBERT, a versatile writer of poetry and prose, born in Warwickshire, England, Aug. 18, 1841. He was educated at Glasgow University, and while a mere boy went to London to seek his fortune. His first work, *Undertones*, a volume of verse published in 1863, was well received; but his first distinct success was *London Poems*, published in 1866. Later volumes of verse are a translation of Danish ballads, and *Wayside Posies* (1866); *North Coast Poems* (1867); *Napoleon Fallen: a Lyrical Drama* (1871); *The Drama of Kings* (1871); *Ballads of Love, Life, and Humor* (1882); and *The City of Dream* (1888). He has contributed prose to the magazines, and has written several novels, among them *A Child of Nature* (1879), *God and the Man* (1881), *The Martyrdom of Madeline* (1882), and *Foxglove Manor* (1884). He was successful as a dramatist with *A Nine Days' Queen*, *Lady Clare*, *Storm-beaten*, and *Sophia*.

BUCHANAN, a village of Michigan, is situated on the St. Joseph River, about eighty-five miles east of Chicago. It contains a number of manufacturing, and is the trade-center of an extensive farming and fruit-growing region.

BUCHANITES, a sect of fanatics which sprang up in the west of Scotland in the last quarter of the 18th century. Its founder was Elspeth Buchan, born in 1738, the daughter of John Simpson, a wayside inn-keeper near Banff. Separating from her husband, Robert Buchan, she began to preach strange religious doctrines, which she professed to find in the Scriptures. Expelled from the town by the magistrates in 1784, she established herself near Thornhill with a few followers. The poet Burns, in a letter (August, 1784), speaks of their idleness and immorality. Mrs. Buchan died in May, 1791; the last survivor of her sect died in 1848.

BÜCHNER, LUDWIG, a German physician and materialist philosopher, born at Darmstadt, March 29, 1824. He studied at Giessen, Strasburg, Würzburg, and Vienna; became a lecturer at Tübingen University, and in 1855 published *Kraft und Stoff* (14th ed., 1876; English translation, *Force and Matter*, 1870), in which he attempted scientifically to establish a materialistic view of the universe. As a result of the controversy caused by the appearance of this work, Büchner was compelled to resign his University post, and began medical practice in Darmstadt. He has been a frequent contributor to periodicals on physiological and pathological subjects, as also in support of his atomistic philosophy. *Natur und Geist* (1857; 3rd ed., 1876), and *Aus Natur und Wissenschaft* (1862), are works in the latter department. He has also written on Darwinism, the idea of God, the intelligence of animals, and has translated Lyell's *Antiquity of Man* (1864).

BUCK, DUDLEY, born in Hartford Conn., March 10, 1839. He studied at Trinity College, and received a musical education at the Leipsic Conservatory of Music, and afterwards was instructed by Hauptman, Rietz, Richter, Plaidy, Moschelles, and Schneider. He has been organist of the Music Hall,

Boston, assistant director of the New York garden concerts, composer of the centennial cantata sung at Philadelphia in 1876, organist of Holy Trinity in Brooklyn, and director of the Apollo Club. Mr. Buck has written operetta, organ compositions, song music, and has published *Dictionary of Musical Terms*, and *Influence of the Organ in History*.

BUCKAU, a manufacturing town of Prussian Saxony, practically a suburb of Magdeburg. Population, 16,049.

BUCK-BEAN, BOG-BEAN, or MARSH TREFOIL, common names of *Menyanthes trifoliata*, a species of *Gentianaceæ*, widely distributed in the more temperate parts of the northern hemisphere. It has trefoiled leaves, small fringed flowers, and usually grows in marshy places. It is a bitter tonic. The root-stock was formerly used as a sort of starchy food in Northern Europe.

BUCKEYE, an American name for several trees and shrubs of the same genus (*Æsculus*) as the horse-chestnut. The more commonly distinguished species are *Æsculus glabra*, known as fetid buckeye, *Æsculus Californica*, California buckeye, and *Æsculus flava*, the sweet buckeye.

BUCK-HOUND, a species of hunting-dog, resembling a small staghound, used by sportsmen for hunting bucks.

BUCKIE, a fishing-town of Banffshire, Scotland, situated 13 miles northeast of Elgin by rail. It is the head of the fishery district from Banff to Findhorn. The present harbor, constructed of concrete at a cost of £60,000, consists of an outer and an inner basin, with an area of nine acres. Population, 4,350.

BUCKINGHAM, JAMES SILK (1786-1855), English traveler and lecturer, was born at Flushing, near Falmouth, in 1786, and went to sea at an early age. After years of unsettled and wandering life, he established a journal at Calcutta, the boldness of whose strictures on the Indian government led to his expulsion from Bengal. In London he established the "Oriental Herald" (1824), and the "Athenæum" (1828), now the leading weekly literary journal. He subsequently traveled through the United States. He was projector of a literary club, the British and Foreign Institute (1843-46); and president of the London Temperance League (1851). Besides eighteen books of travel, etc., he had published two volumes of his autobiography when he died, June 30, 1855.

BUCKLAND, CYRUS, inventor, born in Manchester, Conn., Aug. 10, 1799, was educated at a common school. At the age of twenty-one he became interested in mechanical pursuits, and in 1828 entered the United States armory at Springfield, Mass., as pattern-maker, where he subsequently became designer of machinery and tools for the manufacture of fire-arms. While occupying this position he made great improvements both in the machinery used and in the guns, raising the standard in all the mechanical departments. His chief invention was a set of machines for working up gun-stocks from the rough state till they were complete, except the outward smoothing. So important was this invention that the British Government sent commissioners over to copy the machines and to obtain skilled workmen from the Springfield armory. Mr. Buckland received no compensation for his valuable inventions beyond his daily wages; but at his retirement in 1859, Congress voted him \$10,000.

BUCKLER, a sort of shield used in ancient and mediæval times. It was usually grasped by the hand only, and in combat was interposed to receive the blow of a sword. The early Roman style was four feet long and 2½ feet broad; it was plated on the outside with iron and lined with sheep-skin



and linen. Later on the shield was of a square or rounded form, generally composed of wicker-work or hide, plated with metal.

BUCKLEY, JAMES MONROE, a prominent Methodist divine, born in Rahway, N. J., Dec. 16, 1836. He was educated at Pennington Seminary, N. J., and Wesleyan University. He has been pastor in Detroit, Mich., and in Brooklyn, N. Y.; has three times been a member of general conference, was elected editor of "New York Christian Advocate," and has written *Two Weeks in the Yosemite Valley*, *Cats and Wild Cats*, *Land of the Czar and the Nihilist*, and other books.

BUCKNER, SIMON BOLIVAR, born in Kentucky in 1823, graduated at West Point in 1844; was there made professor of ethics in 1846, and assistant instructor of infantry tactics from 1848 to 1855. He subsequently practiced law, and at the outbreak of the civil war joined the Southern Army. He surrendered Fort Donelson to Gen. Grant, Feb. 16, 1862, was imprisoned in Boston harbor, and on his release took command in Bragg's army; was made major-general, fought at Murfreesborough and Chickamauga, and surrendered at Baton Rouge, May 26, 1865.

BUCKSKIN, a soft leather made of deerskin or sheepskin; also a strong, twilled woolen cloth, cropped of nap and carefully finished. "Buckskin breeches" are usually of this cloth, not of the leather.

BUCKSPORT, a village of Maine, situated on the west bank of the Penobscot, twenty miles below Bangor. It is the seat of the East Maine Conference Seminary, and contains various manufactories. The harbor is accessible to large vessels, and ship-building and fishing are the chief industries.

BUCKSTONE, JOHN BALDWIN, comedian and dramatic writer, born at Hoxton, London, in 1802, died Oct. 31, 1879. Having, in 1822, exchanged an attorney's office for the provincial stage, he appeared the next year at the Surrey Theater. His success was so unequivocal that in 1827 he was engaged by the Adelphi Theater, where he continued till 1833 as leading low comedian. Except for a visit to the United States in 1840, and short engagements at Dury Lane and the Lyceum, he thenceforward played chiefly at the Haymarket, of which he was lessee from 1853 till 1878. Buckstone's acting was noted for its distinct appreciation of the peculiar traits in each individual character he assumed. He was also a prolific dramatic author, and several of his pieces have been highly popular.

BUCKTHORN (*Rhamnus*), a genus of *Rhamnaceæ*, including a number of species distributed through temperate and tropical regions. The common buckthorn, *Rhamnus catharticus*, is characterized by its spinous and cross-like branchlets, serrate leaves, and yellow-green dioecious flowers. The berries are violently purgative and were formerly much used in medicine. They supply the sap green of painters. The bark affords a beautiful yellow dye. Dyers' buckthorn, *Rhamnus infectoria*, is a low shrub, abundant in the South of Europe, whose unripe fruit yields a brilliant yellow dye. The alder-buckthorn, *Rhamnus frangula*, or, in the United States, *Rhamnus Caroliniana*, is spineless, with oval entire leaves, and small, whitish, axillary flowers. The charcoal of the wood is light, and is used by gunpowder-makers. The sea-buckthorn, of the coasts of Europe, the *Hippophaë rhamnoides*, is a shrub of a different genus and order. Southern buckthorn, of the United States, is a small sapoteaceous tree, *Bumelia lycioides*.

BUCOLIC, a term derived from the Greek word signifying "belonging to herdsmen," nearly equal to *pastoral* from Latin. It is especially used of a

kind of pastoral poetry representing rural affairs, or the life, manners, and occupation of the shepherds. The great bucolic poets were Theocritus, Bion, Moschus; and Virgil's Eclogues are sometimes called *Bucolica*.

BUCYRUS, a town in Ohio, county-seat of Crawford county. It is situated on the Sandusky River, sixty-five miles north of Columbus. It is the center of an extensive farming district, and the headquarters of numerous manufacturing industries. A fossil mastodon was discovered here in 1838. In the town and its vicinity occur a number of valuable mineral springs.

BUCZACZ, a town of Austria, in Galicia, situated on the Stripa, an affluent of the Dneister, 47 miles northeast of Stanislaw by rail. A treaty of peace between the Poles and Turks was signed here in 1672. Population, 9,970.

BUDDING, in horticulture, a process in the propagation of ligneous plants analogous to grafting. See HORTICULTURE, Britannica, Vol. XII, p. 237.

BUDDLEA, a genus of shrubs of the natural order *Scrophulariaceæ* (sub-order *Loganiaceæ*), of which many species are known, all natives of the warmer parts of the world, and some of them much admired for their beautiful flowers. *Buddlea globosa*, a native of Chili, is hardy enough to endure the climate of most parts of England, and several half-hardy species have also been introduced.

BUDRUN, a seaport town of Asiatic Turkey, situated on the north shore of the Gulf of Kos, about 96 miles south of Smyrna. It is the site of the ancient Halicarnassus, the birthplace of Herodotus and Dionysius. Population, 6,000.

BUELL, DON CARLOS, an American officer, born in Ohio, March 23, 1818; graduated from West Point in 1841; served in the Mexican war from 1846 to 1848; was assistant adjutant-general at Washington in 1848 and 1849, and at headquarters of various departments from 1849 to 1861. He assisted in organizing the Army of the Potomac, and soon after superseded Gen. W. T. Sherman in the department of the Cumberland, afterwards the Ohio. In 1862 he was made major-general of volunteers, and in July of the same year assistant adjutant-general. He was engaged at the battle of Shiloh and the siege of Corinth. His army retreated before Bragg's, through Tennessee to Louisville, from which place, being reinforced by Thomas, he pursued Bragg, who was obliged to turn southward, and was slowly driven from Kentucky. Buell did not force another engagement, as it was thought he should have done, and his command was transferred to General Rosecrans. There was an official investigation of his conduct, but the report was not made public. He resigned his commission June 1, 1864. Since that time he has been president of the Green River Iron Works of Kentucky, and later pension agent at Louisville, Ky.

BUENAVENTURA, a town on the Pacific coast of the Republic of Colombia. It has a hot, sickly climate, but is the port for the healthful and rich Cauca valley. Population, 5,000.

BUENA VISTA, a rich mining city of Colorado, county-seat of Chaffee county. It is situated at an altitude of nearly eight thousand feet, near the confluence of Cottonwood Creek with the Arkansas River, about thirty-five miles south of Leadville. The interests of many of the richest silver mines of the State center here, and the surrounding country includes also a small but fertile agricultural section. The climate is mild and healthful, and in the neighborhood are a number of favorite health and pleasure resorts.

BUENA VISTA, a village of Mexico, seven miles south of Saltillo, where, on Feb. 22-23, 1847, some

5,000 United States troops under Taylor defeated 20,000 Mexicans under Santa Anna.

**BUEN-ARJRE**, a West Indian island, 60 miles from the coast of Venezuela, and 30 east of Curaçao, belonging to the Dutch. It produces timber, cattle, cochineal and salt. Area, 127 square miles; population, 4,898.

**BUENOS AYRES**. For the history and early growth of this greatest city of the Argentine Republic, see *Britannica*, Vol. IV, pp. 440-442. The later statistical returns show progress in several important items. The rapidity of its growth in population is most remarkable—statisticians pronouncing it without parallel. At the date of the last census, which was taken in September, 1887, the effective population of the city, including visitors, was 433,375. The legal population—that is to say, the population born on the spot—was only 75,062. The balance consisted of 129,672 born in various parts of the republic, and 228,641 foreigners. At the time of the last preceding census, which was taken in 1869, the total population of the city and suburbs was only 187,126; so that it has more than doubled in 18 years. The present annual increase of population in Buenos Ayres is greater than that of Chicago or any other North American city. The proportion of foreigners is 112 to every 100 Argentines. Of the 228,641 foreigners Italians are the most numerous, numbering 31.1 per cent., while North Americans number less than 4 per cent.

The city has naturally increased with the growth of its population. In 1869 the city and suburbs contained a total of 20,858 houses, while in 1887 the census gave a total of 33,804. The increase is really much larger than the figures indicate, for a large number of huts or ranchos were returned as houses by the census of 1869, which have since been replaced by larger and substantial buildings.

In religious faith the city is overwhelmingly Roman Catholic, 97.8 per cent. professedly belonging to that faith. There are six street railway companies, with 199,378 kilometers of track, 342 cars, and 5,882 horses. During the first three months of 1890 these railroads transported 10,177,078 passengers.

Great progress has also been made in educational matters. There are two universities with a total attendance of 993 students. In 1889 234 diplomas were delivered, including 81 to doctors of law, 85 to medical practitioners, and 11 to civil engineers. In addition to several colleges and normal schools, there are in Buenos Ayres 285 primary schools, directed by 1,571 teachers and attended by 54,509 pupils. A large proportion of the school-houses are the property of the nation. About 100 periodicals are published in the city.

In commerce, in the arts, and in manufactures the Argentine capital has made remarkable progress, there being upwards of 6,000 industrial establishments in the city, giving employment to more than 40,000 persons.

**BUFFALO**, in zoölogy. See *Britannica*, Vol. IV, p. 442. See also *Bison*, in these Revisions and Additions.

**BUFFALO**, a city of New York, located at the eastern extremity of Lake Erie, where the lake contracts to form the Niagara River. See *Britannica*, Vol. IV, p. 443. It has a water front of nearly four miles on the lake, and about the same on the Niagara river. That portion of the city fronting on the lake rises gradually to a height of 50 feet above the level of the harbor, and at a distance of about two miles becomes an extended undulating plateau. The other portion, fronting on the river, is on a bluff 60 feet in height. The streets are broad and

straight, intersecting at right angles, and are generally lined with trees. Water is brought through a tunnel extending into the middle of Niagara River, through which 43,000,000 gallons are daily distributed through 281 miles of mains to consumers. The park system includes Forest Lawn Cemetery, containing 75 acres, and a beautiful lake dotted with numerous islands, covering 40 acres. The harbor is protected by a breakwater 7,600 feet in length, running parallel with the shore, and a shore arm of piles and crib-work 4,100 feet long, running out towards the southern end of the main or detached breakwater. Buffalo is one of the greatest railroad centers in the world, having within the city limits 638 miles of railroad.

The grain trade of Buffalo is immense. In 1843 Joseph Dart erected the first elevator for storing and transferring grain by steam-power. It had a storage capacity of 55,000 bushels, and a transfer capacity of 15,000 bushels per day. In 1890 the aggregate storage capacity of the numerous elevators was 13,080,000 bushels, and the daily transfer capacity 4,000,000 bushels. In 1890 the grain receipts were 89,312,800 bushels. The trade in live-stock is also very extensive, the stockyards covering 80 acres of ground, well paved, and protected by sheds.

Public buildings are numerous, and display superior architectural taste. Among the more noteworthy are the City and County Hall; the Erie county jail; the Postoffice building; Police headquarters; Music Hall; Buffalo Library; State Insane Asylum; County Almshouse; Young Men's Christian Association building; and the State Normal and Training School.

Buffalo has 40 public schools, and upwards of 50 private schools and colleges. One of the public schools (No. 31) is the largest in America, having 2,775 registered pupils. There are several libraries, the Buffalo Library ranking among the foremost in the country. Population in 1880, 155,134; in 1890, 254,457.

**BUFFINGTON**, **ADELBERT R.**, soldier, born in Wheeling, Va., Nov. 22, 1837. He graduated at the United States Military Academy in 1861. He drilled volunteers at Washington for the civil war for a month (1861) and was made first-lieutenant of ordnance in 1862. For a year he was engaged in mustering Missouri and Illinois volunteers, afterwards assisted in the defense of Pilot Knob, and was successively commander of the arsenals at New York, Baton Rouge, Watertown, Detroit, Watervliet, Indianapolis, Alleghany, and in 1881 was placed in command of the National Armory. For eleven years he was on leave of absence inspecting arms for the Egyptian government. He has perfected various inventions, among them the magazine gun and carriages for light and heavy guns. He reduced the cost of manufacturing rifles at the Springfield armory, and was the originator of the nitre and manganese method of bluing iron and steel, in use at the National Armory.

**BUFF LEATHER**. See **OIL LEATHER**, *Britannica*, Vol. XIV, p. 390.

**BUFFOON** (Italian, *buffa*, "a trick"), one who entertains others by tricks, odd gestures, and other vulgar pleasantries; a clown. From the same word comes *buffo*, "a comic actor or singer"; and the French name, *opéra-bouffe*, for comic opera. See **Fool**, *Britannica*, Vol. IX, p. 366.

**BUFORD**, **JOHN**, American officer, half-brother of N. P. Buford, born in Kentucky in 1825, died in Washington, D. C., Dec. 16, 1863. He was a West Point graduate, served against the Indians on the plains, and at the commencement of the civil war was assistant inspector-general. In 1862 he entered active service, being on the staff of General Pope



in Northern Virginia, engaged at Madison Court House, the passage of the Rapidan, Kelly's Ford Thoroughfare Gap, Manassas, South Mountain, Antietam, Fredericksburg, Gettysburg and many other battles. Just before his death he was assigned from the Army of the Potomac to the Army of the Cumberland. Buford was an admirable cavalry officer. He died from the effects of exposure and wounds.

**BUFORD, NAPOLEON BONAPARTE**, American officer and engineer, born in Woodford county, Ky., Jan. 13, 1807, died March 23, 1883. He was a West Point graduate; served as lieutenant of artillery on various surveys, and was appointed as instructor at West Point. In 1861 he entered the Union army; was engaged at the battles of Belmont, Mo., Island No. 10, and at the sieges of Corinth and of Vicksburg. In 1865 he was brevetted major-general of volunteers, and five months later (August) mustered out of service. After the close of the war General Buford was United States commissioner of Indian Affairs (1868) and inspector of the Union Pacific Railway (1867-69).

**BUGBANE**, or **BUGWORT**, a name given to species of plants belonging to genus *Cimicifuga*, in Europe applied to *Cimicifuga fetens*, and in the United States to *Cimicifuga racemosa* and *Cimicifuga americana*, from their reputed virtues as destroyers of insects. The term is sometimes applied to the white hellebore, *Veratrum viride*.

**BUGEAUD, THOMAS**, French marshal, born at Limoges in 1784, died of cholera at Paris, June 9, 1849. He entered the army at the age of 19, and by his bravery during the Napoleonic campaigns earned a colonelcy, which was bestowed in 1814. Recalled from a 15 years' retirement to active life by the July revolution of 1830, he was elected deputy for Perigueux, and soon gained Louis Philippe's esteem; in 1836 was dispatched to Algeria, where he distinguished himself against Abd-el-Kader, and in 1840 was appointed governor-general. The Zouaves owed their organization to him. In 1843 he received the marshal's *baton*, and the following year his victory at Isly over the Emperor of Morocco's forces gained him the title Duc d'Isly. In the revolution of February, 1848, he commanded the army in Paris.

**BÜGGE, EISEN SÖPHUS**, a Norwegian philologist born at Laurvik, Jan. 5, 1833; studied at Christiania, Copenhagen and Berlin, and in 1866 was appointed professor of Comparative Philology and Old Norse at the University of Christiania. His Old Norse ballads (1858) and historical legends (1864-65); critical edition of the earlier *Edda* (1867); studies in ancient Italian dialects (1878), and on the origin of the Scandinavian legends of gods and heroes (1881-82), besides numerous dissertations on all departments of the Teutonic and Romanic languages, place him in the first rank of living philologists.

**BUGLE**, the common English name of *Agave reptans*, a low labiate plant of Europe. Its flowers are generally blue, but white and purplish varieties are sometimes grown in flower-borders. *Agave alpina* is one of the beautiful flowers of the Swiss Alps.

**BUGLE**, a name for the slender, elongated kind of bead, usually black, used in decorating female apparel.

**BUGLOSS**, a name popularly applied to many plants of the natural order *Boraginæ*, more strictly to *Anchusa officinalis*. The small wild bugloss is *Asperugo procumbens*; viper's bugloss is the English name of the beautiful *Echium vulgare*. Both these plants are naturalized in the United States. Other varieties are the small bugloss, *Lycopsis arvensis*, and the sea-bugloss, *Mertensia maritima*.

**BUHRSTONE**, or **BURSTONE**, a name given, without reference to geological relations, to certain vari-

eties of stone, whose dressed surfaces present a keen-cutting texture, which adapts them for use as millstones. Buhrstones are quarried at Conway in Wales, at several places in Scotland, and in various parts of the United States, but the most desirable varieties are obtained from the quarries of La Ferte-sous-Jonarre, in the department of Seine-et-Marne, near Paris, and from the Eocene strata of South America. The stone is found in beds or in detached masses, and the mode of quarrying is peculiar. When the mass is large, it is cut out into the form of a huge cylinder; around this grooves are cut, at distances of about 18 inches, the intended thickness of the millstones; into these grooves wooden wedges are driven, and water is thrown upon the wedges, which, causing the wood to swell, splits the cylinder into the slices required. It is not unusual to form millstones of pieces of buhrstone cut into parallelipeds and bound together by iron hoops.

**BUILDING ASSOCIATIONS**. See *Britannica*, Vol. IV, pp. 513-14.

**BUILDING-LEASE**, a lease of land for a term of years, under which the lessee is bound to erect certain buildings on the land according to specification, these buildings to become the property of the landowner on the expiration of the lease. The term of ninety-nine years has come to be associated with building leases in England, but such leases are granted for various periods. In the United States building leases may continue for any term of years agreed upon by the parties, no time being specified by State or United States law.

**BUKKUR**, a fortified island of the Indus, in Sind, between the towns of Rohri and Sukkur. The fortress occupies almost the whole island, but has now no military value.

**BULGARIA**, a principality now incorporated with Eastern Roumelia and under the suzerainty of Turkey. Area, including that of South Bulgaria, (E. Roumelia) 38,562 square miles, population, 3,154,000. For early history and productions, see *Britannica* Vol. IV, pp. 516-17; capital, Sofia, with a population in 1889, of 30,438.

Bulgaria, made a principality by the treaty of Berlin, July 13, 1878, was to be governed by a prince elected by the national assembly (*Sobranje*), with a legislature and a constitution. Prince Alexander, of Battenberg, was elected sovereign, and at a meeting held in 1881 the *Sobranje* invested him with extraordinary powers and authorized him to convoke, at the close of seven years, a *Sobranje* to form a revised constitution to be promulgated in 1888. The Prince, however, was compelled to abdicate in 1886.

On July 7, 1887, Prince Ferdinand, of Saxe-Coburg (born in Vienna in 1861, youngest son of Prince Augustus of Saxe-Coburg and Princess Clementina, daughter of Louis Philippe), was elected to fill the vacancy caused by the deposition of Prince Alexander. He accepted the position, and took the oath of office at Tirnova. At the time of his election he was an officer in the Austrian army. His sovereignty has not been recognized by the Powers, and his tenure of office is generally regarded as precarious. Russia is strongly opposed to his incumbency. He is now (1891) 30 years of age.

The province of Eastern Roumelia, which received its autonomy in 1878, united itself with the principality of Bulgaria in 1885, and six months later Turkey agreed to the union. Bulgaria, which had previously paid no tribute, agreed in 1887 to pay \$700,000 a year as the Roumelian contribution to Turkey.

In 1890 the combined public debt of Bulgaria was reported as about \$10,000,000, of which about

\$2,000,000 was the share of Eastern Roumelia—exclusive of the liability to Turkey.

An electoral law passed in 1882 establishes two grades of electors to the Sobranje. Those of the first degree included all persons holding public office, graduates, ecclesiastics, owners of real estate and their children, and persons practicing an independent calling, such as merchants, farmers, manufacturers, and employers of labor. Every 50 electors of the first degree were to nominate one of the second degree; and the men so nominated were to elect the deputies by *scrutin-de-liste* in the thirteen departments. The normal period of election is six years. Other laws were subsequently passed to determine the method of municipal elections, to establish the judiciary organization, and to provide for the institution of a Second Chamber. Some of these measures are already in operation; but the frequent disturbance of the country has made it impossible to change the electoral machinery, and in the meantime the Great Sobranje, or National Assembly on the wider franchise, has had the direction of affairs in its own hands.

BULBUL, a Persian name for the nightingale, which was introduced into English poetry by Moore, Byron and others. In ornithology the name is given to a very different bird, *Pycnonotus hamorrhous*, usually ranked among the babbling thrushes. It is a little bird of brilliant plumage, remarkable for its pugnacity. The name bulbul is also applied to several related forms.

BULL, a ludicrous blunder in speech implying some obvious absurdity or contradiction. The origin of the name is supposed to be due to the contrast in papal bulls between the assertion of excessive humility in the title, by which the pope styles himself "servant of servants," and his assumption of absolute supremacy and authority over the world. Bulls are commonly regarded as especially characteristic of the Irish. Coleridge, remarking on the well-known bull, "I was a fine child, but they changed me," says: "The bull consists in bringing together two incompatible thoughts, with the sensation but without the sense of their connection."

BULL, JOHN, a generic name for an Englishman as a personification of what is supposed to be the English type, from Arbuthnot's use of the name in his *History of John Bull* (1712; reprinted complete in Pope's *Miscellanies* in 1728). The description of bull is very similar to the familiar figure in the pages of "Punch."

BULL, OLE BORNEMANN, violinist, born in Bergen, Norway, Feb. 5, 1810, died there Aug. 18, 1880. At the age of five he began to show musical talent by his performances on the violin, and at nine years of age played as first violinist in the theater where his father was an actor. After unsatisfactory experiences with various teachers and schools he went to Paris, where he was befriended by Madame Villeminot, and, under the patronage of the Duke of Montebello procured means for a tour through Switzerland and Italy, giving concerts and stopping at Milan to study music. His first great success was achieved at Bologna; was followed by a series of successful concerts in the principal cities of Italy, and he returned to Paris in 1835 with an established reputation. He subsequently visited London, the various countries of Europe, traveled through the United States, Canada and the West Indies, returning to Norway in 1848. In 1852 he paid a second visit to America, where he spent five years. He endeavored to found a colony, "Oleana," in Potter county, Pa., but in this enterprise was not successful. For several years he spent his winters in America and his summers in Europe. His life

has been written by his widow; the book is entitled *Ole Bull: a Memoir*.

BULLACE, *Prunus insititia*, a shrub or small tree, larger and much less spiny than the sloe, but very closely allied to it, as it is also to the plum, so that many botanists regard them all as one species. The fruit is larger than the sloe, generally globose, and is used like damsons. The bullace is a native of Asia Minor and Southern Europe, but now common in hedges and coppices in England, and is sparingly naturalized in the United States. Bullace is a popular name of *Melicocca bijuga*, a common West Indian tree; in the United States it is given to the muscadine grape, *Vitis vulpina*.

BULLE, or BLEBS, are collections of serous fluid, situated immediately beneath the cuticle, and raising it from the true skin. They differ from vesicles only in being of larger size. The most familiar examples are the "blisters" produced on the hands by rowing or the feet by walking. They are occasionally met with in many diseases of the skin, as eczema, erysipelas, etc.; but in pemphigus and in some forms of hydroa they constitute the chief feature of the disease.

BULL-BATING, a barbarous sport once very popular in England. A number of dogs were set on to attack a bull, whose nose, that he might be made as furious as possible, was sometimes blown full of beaten pepper before he was turned loose. Another form of the sport was to fasten the bull to a stake, by a rope some yards in length, and to set bull-dogs on him, one at a time, which were trained to seize him by the nose, and when this was accomplished it was called "pinning the bull." But no small part of the enjoyment of the spectators was derived from the success with which the attacks of the dogs were met by the bull lowering his head to the ground, and receiving them on his horns, often tossing them to a great distance. King James I. delighted in this sport; and when the Czar Nicholas of Russia visited England, before his accession to the empire, a boxing-match and a bull-bating were got up to show him English tastes. Bull-bating was declared illegal in 1835.

BULLET, the leaden projectile discharged from any kind of small-arm. Case-shot or canister and shrapnel shell are also filled with spherical bullets hardened by the addition of antimony to the lead. Formerly all bullets were spherical, and cast in molds. The bullet used for rifles of recent construction is elongated and conical at the apex, with a hollow at the base, into which some kind of plug is inserted, which, driven into the lead by the force of the explosive, forces the base of the bullet outward till the lead takes the grooves in the rifled barrel, thus giving the bullet a rotation during the motion forward. The plug is sometimes omitted, the base of the bullet being forced into the grooves by the expansive force of the powder. The advantage of rotary motion is that it steadies the ball, causing it to travel point first, thus enabling a heavier, because longer, projectile to be fired with accuracy from a smaller bore than was formerly used, thereby presenting less surface to the resistance of the air, and so increasing the range.

The diameter of rifle-bullets has been decreasing ever since their introduction. Bullets are now made by means of a machine, which unwinds a leaden rod of the proper thickness, cuts it into the required length, and stamps the bullets into shape by means of steel dies, dropping them into a box when finished. Each machine can turn out 7,000 per hour, and one man can attend to four machines.

BULLET-TREE, or BULLY-TREE, a sapotaceous tree of the West Indies and tropical America, valued for its wood, which is solid, heavy, close-



grained, and durable, and also in some species for its fruit. The bullet-tree of Guiana, *Mimusops globosa*, yields balata-gum, a valuable substitute for India-rubber. Other fruit-bearing congeners are *Bumelia retusa*, the bastard bully-tree, and *Bumelia ingens*, the black bully-tree, while *Lucuma mammosa*, of which the fruit is called the marmalade, is sometimes called Jamaica bully-tree.

**BULLETIN**, diminutive of bull, an official report concerning some public event, especially a report of news recently received, and issued for the information of the public.

**BULL-FIGHT**, a combat of men with bulls for the entertainment of the public, common in Greece, particularly in Thessaly, and in Rome under the emperors, though in later times forbidden both by emperors and popes. The bull fight is still a favorite spectacle in Spain and Mexico. Formerly the most magnificent bull-fights were instituted by the monarchs themselves; at present, both in the capital and in the larger towns of Spain, they are held either as speculations or for the benefit of public institutions. Every large town in Spain possesses a *Plaza de Toros*, and so do many towns in Spanish America; those of Madrid, Seville, and Caceres are especially handsome. Bull-fighters personally are esteemed much as prize-fighters are in this country; but they are the idols of the lower classes, from whose ranks they are drawn.

**BULLFINCH**. See *Britannica*, Vol. IV, p. 518.

**BULLOCK**, RUFUS BROWN, born in Bethlehem, N. Y., March 28, 1834. For many years he was connected with the Adams Express business in the Southern Atlantic States; he was active in extending telegraph and railroad lines and in the organization of the first national bank of Georgia. He was delegated to the convention which framed a new State constitution after the civil war, and was elected governor of Georgia in 1868. During his term the reactionists in the legislature secured a majority, and the colored members were expelled from their seats; but the governor was enabled, through authority conferred by Congress, to reassemble the legislature and restore them to their rights. His course in this matter developed the spite and abuse of many, and charges of corruption were brought against him, but he was vindicated by the courts. During his term the State increased much in prosperity, but at its close he refused to take any further part in politics.

**BULLOCK**, WILLIAM, inventor, born in Greenville, N. Y., in 1813, died in Philadelphia, Pa., April 14, 1867. He became an iron-founder, making a careful study of mechanics. After engaging in various enterprises he commenced the publication of the "Banner of Truth," for the printing of which he made a hand-press of wood turned by a crank, and having a self-feeder attached. He continued his experiments in regard to printing-presses, and soon constructed a fast press on the planetary system, which was used for printing "Frank Leslie's Illustrated Weekly." This made him famous, but he attained to even better results. He built a press consisting of a single machine which was self-feeding, printed on both sides, cut the paper at regular intervals and delivered 12,000 sheets an hour. Further improvements raised the speed of the press till 30,000 sheets could be delivered in an hour. Mr. Bullock's presses rapidly took the place of all preceding ones. Since their invention the idea has been enlarged upon by other inventors and further improvements made.

**BULL-ROARER**, a toy made of a thin piece of wood usually about eight inches long and three broad, sharpened somewhat at the ends, to one of which a string about 30 inches in length is tied, by

means of which it is whirled rapidly in the air, causing by its revolution a loud and peculiar whizzing noise. An instrument of the same kind is to be found in almost every country in the world. It has been identified with the *rhombos* used in the ancient Greek mysteries, and is to this day employed in religious rites or mysteries in New Mexico, New Zealand, and South Africa.

**BULLS AND BEARS**. In the slang of the stock exchange, a "bull" is a person who seeks artificially and unduly to raise the price of stock, and speculates on a rise. On the other hand, a "bear" is one who speculates on a fall; who sells stock for delivery at a future date, in the hope that meanwhile prices will fall, so that he will buy at a lower price what he has sold at the higher price.

**BULL-TROUT**, a name applied to certain species of the salmon genus, especially to *Salmo cambricus*. By anglers it is considered next to the salmon as a prize, and by many is mistaken for it. The laws for fishing salmon apply also to the bull-trout. See *Britannica*, Vol. XXI, p. 222.

**BÜLOW**, HANS GUIDO VON, a German pianist and composer, born at Dresden, Jan. 8, 1830, the son of Karl Edward von Bülow (1803-53), poet and author. Hans qualified at Leipzig and Berlin for a legal career; but, subsequently resolving to give himself to music, spent some time with Richard Wagner, and in 1857 became the pupil of Liszt, whose daughter he married. In 1854 he became Prussian court-pianist, in 1864 pianist to the Bavarian court and head of a music school at Munich. In 1869 family troubles led him to resign his appointments and retired to Florence, and subsequently he undertook the great concert tours through which he became known in England and America. In 1880 he settled as director of music to the court at Meiningen. He is a brilliant pianist, remarkable for skill in conquering technical difficulties, and is famous as a concert director, and as a representative of the Liszt-Wagner school. He has produced works for piano and for the orchestra, as also numerous editions of pieces by the great musicians, with arrangements and transcriptions from the works of Berlioz, Wagner and Liszt.

**BULRUSH** (formerly sometimes written bull-rush), a popular name for large rush-like or reed-like plants growing in marshes, not very strictly limited to any one kind. The term both in literature and botany is more particularly applied to two distinct plants of somewhat similar vegetative habit; namely, *Typha latifolia* and *Scirpus lacustris* (see *Britannica*, Vol. XX, p. 319), perhaps more generally restricted to the latter, a tall rush-like plant from which the bottoms of chairs, mats, etc., are manufactured. *Typha latifolia*, also called reed-mace or cat's-tail, is a large handsome plant of grass-like habit, and reaching a height of 5 to 7 or 8 feet, and applied to uses almost identical with the preceding. In the United States the name is given to species of *Juncus*. The bull-rush of Egypt is the papyrus *Cyperus papyrus*.

**BULSAR**, a seaport of India, in the district of Surat, on the estuary of the river of the same name, 115 miles north of Bombay by rail. Timber is the chief export. Population, 13,229.

**BULTI**, a name given to the northern part of Kashmir, once an independent state.

**BUL-TSO** ("Borax Lake"), a lake of Thibet, 100 miles northwest of Lassa. Its area is 24 square miles.

**BUMBOAT**, a boat used in peddling provisions, fruit, and small wares among vessels lying at some distance from the shore.

**BUNBURY**, HENRY WILLIAM, an English caricaturist, born at Mildenhall in Suffolk in 1750, died in 1811. Educated at Westminster and Cambridge,

he early became distinguished for his humorous designs, which gave him the right to rank after Rolandson and Gillray. He usually avoided political subjects. He drew mainly in pencil and chalks, but also produced water-colors.

BUNCE, OLIVER BELL, author, born in New York city, Feb. 8, 1828, died May 15, 1890. He was educated at the then famous Ranks Academy of his native city, and became a bookseller and publisher. He was on the editorial staff of "Appleton's Journal" during its publication, and was a contributor to other periodicals. He is well known by his popular little book on manners, entitled *Don't*. His other writings are *A Bachelor's Story*, *The Romance of the Revolution*, *Life Before Him*, *Bensley*, *Bachelor Bluff*, *My House An Ideal*, *Timias Terrystone*, *Marcos Bozaris*, and *Love* in '76.

BUNCOMBE, EDWARD, soldier, born in St. Kitts, West Indies, died in Philadelphia, Pa., in 1777. He was educated in England, but came to live in Tyrrel county, N. C. He fought in the Revolutionary war at Brandywine and at Germantown. In the latter battle he was wounded, captured and died soon after from his wounds. A county of North Carolina was named for him in 1791.

BUNDEHESH, the name of a book in the Pehlevi language, which is one of the most important sources of information as to the Zoroastrian system of belief. There are translations by Justi (1868) and West (1879).

BUNGALOW, the kind of house usually occupied by Europeans in the interior of India, and commonly provided for officers' quarters in cantonments. The bungalow is a one-storied thatched or tiled house, usually surrounded by a veranda; houses of masonry, with terraced roofs, are distinguished as *pucca houses*. The name bungalow is a corruption of the native word *bangla*, "Bengalese," and probably refers to the first district where the form of building was noticed by Europeans. *Dak-bungalows* are houses for travelers, constructed at intervals of from 12 to 15 miles on the highroads in many parts of India and maintained by government. A rupee (about 40 cents) a day is charged for the use of these bungalows.

BUNGAY, an English market town, situated on the Waverney, six miles west of Beccles. It grew up around the 12th-century castle of the Bigods, Earls of Norfolk, some ruins of which still remain; but the town is mostly of later date, having been rebuilt since the great fire of 1688. It has a large printing establishment, and considerable trade in corn, malt, flour, coals, and lime. Population, 3,579.

BUNGENER, LOUIS FELIX, a Protestant writer, born of German family at Marseilles, France, in 1814, died June 14, 1874. He studied theology at Geneva, and became director of the gymnasium there in 1843, but was removed by the new radical government. Engaging in literature, he published a series of writings on theological and historical subjects, but is most widely known for several works, in the form of romances, in which the principles of Protestantism are set forth and defended.

BUNIAS, a small genus of *Cruciferae*. The leaves of *Bunias orientalis* are eaten in Russia, and are used in Western Europe as fodder. The leaves and root of *Bunias erucago* are eaten in Greece.

BUNION, BUNYON, a term applied to enlarged bursæ, or synovial sacs, situated on any part of the foot; but most common over the meta-tarsophalangeal joint of the first or the fifth toe, and accompanied by more or less distortion of the joint.

BUNKER HILL. See *Britannica*, Vol. IV, p. 521.

BUNKUM, BUNCOMBE, a phrase used in the United States for mere bombastic speech-making, intended for the newspapers without regard to the

audience present. There is a county named Buncombe in North Carolina, to which the word seems originally to have been due. Bartlett quotes from Wheeler's *History of North Carolina*: "Several years ago, in Congress, the member for this district arose to address the House, without any extraordinary powers, in manner or matter, to interest the audience. Many members left the hall. Very naively he told those who remained that they might go, too; he should speak for some time, but he was only 'talking for Buncombe.'"

BUNSEN, ROBERT WILHELM, a distinguished German chemist, born at Gottingen, March 31, 1811. He studied zoölogy, chemistry, and physics at the University of his native town, and at Paris, Berlin, and Vienna. He filled the chair of chemistry in succession at Marburg, at Breslau, and from 1852 at Heidelberg. He invented the charcoal pile and the burner which bear his name; discovered that the hydrate of oxide of iron is an antidote to arsenic; was the first to produce magnesium in large quantities, and in 1860 invented the magnesium light, which has proved so important to photography. The greatest discovery with which his name is associated is that of the spectrum analysis, made in conjunction with Kirchhoff, which has been the means of working wonders in chemistry and revealing much to astronomers. Besides his original work in chemistry, Bunsen proved himself a most successful teacher, and his laboratory is still a favorite resort for Americans studying chemistry in Europe. His writings on physics and geology, as well as on chemistry, are numerous.

BUNSEN BURNER, a gas-burner named for its inventor, the distinguished German chemist. Prior to its introduction, the heating by gas or oil was unsatisfactory, owing to the imperfect combustion of the carbon causing the deposit of soot on any body in contact with the flame. By this invention the gas, just previous to burning, is largely diluted with air, thus producing a non-luminous and very hot flame. Probably no other invention has done so much to facilitate work in the chemical laboratory, and it has been adapted for use in connection with a variety of small furnaces, and in many forms of gas-stoves.

BUNT, a parasitic disease of cereals, due in Europe to *Tilletia caries*, a mold belonging to the *Astilagineæ*. The common smut of wheat and corn in the United States is *Ustilago carbo*, and is not called *bunt*.

BUNTER SANDSTEIN, or "variegated sandstone," the German name for the New Red Sandstone. It is the lowest member of the Triassic system. See *Geology*, *Britannica*, Vol. X, p. 352.

BUNTING, a thin woolen material, of which flags of all kinds are usually made. Also a soft, warm fabric in use for women's dresses.

BUOL—SCHAUENSTEIN, KARL FERDINAND, COUNT, an Austrian statesman, born May 17, 1797, died Oct. 28, 1865. He was minister in succession at Karlsruhe, Stuttgart, Turin, and St. Petersburg. He was second Austrian plenipotentiary at the Dresden Conference (1850), after which he was minister at London, until the death of Schwarzenberg recalled him to Vienna, to hold the portfolio of foreign affairs. He presided at the Vienna Conference in 1855, and represented Austria at the Congress of Paris.

BUONONCINI, the name of three Italian composers. The elder, Giovanni Maria (1640-78) wrote instrumental pieces, songs, and church music. His sons, Marc Antonio (1660-1726) and Giovanni Battista (1667-1750), were known as composers of operas. The latter settled in London in 1720, and for some years was very famous and popular.



**BUPRESTIS**, a genus of beetles, typical of the large family *Buprestidae*. Those occurring in warmer countries are conspicuous for bright color and metallic sheen. Some of them are popularly known as *golden beetles*. *Buprestis gigas*, found in Cayenne, is about two inches long. Some small species occur in England. *Buprestis rufipes* is a North American species. See *Britannica*, Vol. III, p. 507; and *COLEOPTERA*, Vol. VI.

**BUR**, in engraving, a slight ridge of metal raised on the edges of a line by the burin, the rocker, or the dry-point. It produces an effect like a smear, and is therefore usually regarded as a defect, and scraped off. Some etchers, however, take advantage of it to deepen their shadows; in mezzotint engraving the whole effect comes from the bur, which is untouched in the deep shades and more or less burnished away in the light. As the bur soon wears off, in valuable old proofs its presence is strong evidence of the early date of an impression.

**BURANO**, an island and town of Northern Italy, five miles northeast of Venice. There is here a school for the designing and making of fine laces; this manufacture, once famous, then nearly extinct, has latterly been revived. Population of town, 4,492; of commune, 8,800.

**BURBAGE**, RICHARD (1567-1618), an English actor, born about 1567, the son of James Burbage, himself an actor, and the builder of the Shoreditch and Blackfriars theaters (see *Britannica*, Vol. XXI, pp. 760-61; Vol. XXIII, p. 224). Richard, who commenced acting while very young, had by 1588 earned considerable reputation, and during the next 10 years outstripped all competitors. On the death of his father in 1597, he became part owner of the Blackfriars Theater; and two years later, in conjunction with his brother, pulled down the Shoreditch house, replacing it with the famous Globe Theater as a summer play-house, while Blackfriars became exclusively a winter-house. To cover the expense Burbage took as partners in his undertaking Shakespeare, Hemming, Condell, and others. At one or other of these two theaters Burbage gained his greatest triumphs, and took the leading part in new plays until his death in 1618.

**BURBOT**, a fresh-water fish of the genus *Lota*, family *Gadidae*. It has an elongated form, depressed head, two small barbels on the nose and a larger one on the chin, a short low anterior dorsal and a long posterior one. *Lota vulgaris* is found in various parts of Middle Europe, in Asia, and in several rivers of England, where it is called *conyfish* and *eel-pout*. An American species (*Lota maculosa*) is found in New England, the Great Lakes, and farther north. In the United States it is commonly known as *eel-pout*, *ling*, and *fresh-water cod*, and is regarded as inferior for food. In the fur countries it is generally known as *losh* or *loche* and *marthy* or *methy*, and its flesh is esteemed.

**BURCHARD**, SAMUEL DICKINSON, born in Steuben, N. Y., Sept. 6, 1812. He became pastor of a Presbyterian church in New York city in 1839. At a ministers' meeting during the Presidential campaign of 1844, he referred to the Democratic party as the party of "Rum, Romanism and Rebellion." The alliterative sentence was quickly picked up by the press, and is thought to have turned the tide which resulted in the election of the Democratic candidate. He died in 1891.

**BURDEKIN**, a river of Queensland, Australia, draining the district of North Kennedy. It rises not far from the coast, and after an irregular course forms a delta emptying into Bowling Green and Upstart bays. It was discovered by Leichard

in 1845, and explored by Dalrymple and Smith, 1859-60. See *Britannica*, Vol. XX, p. 171.

**BURDEN**, HENRY, inventor, born in Dumblane, Scotland, April 20, 1791, died in Troy, N. Y., Jan. 19, 1871. While a lad on his father's farm he showed his inventive genius by making labor-saving machinery. A thrashing-machine was his first successful invention. He pursued a course of scientific studies in Edinburgh, and in 1819 came to America. In 1822 he was connected with the Troy iron and nail factory as agent, but ultimately became sole proprietor of the works. He invented agricultural implements. He made an improved plow, the first cultivator, then a machine for making horse-shoes, and one for the manufacture of hook-headed spikes, such as are now used by nearly all the American railroads. Previous to this these spikes had to be made by hand, and his invention gave a new impulse to railroad building.

**BURDEN OF PROOF**, in legal procedure, signifies the obligation to establish by evidence certain disputed facts; and, as a general rule, this burden lies on the party asserting the affirmative of the issue to be tried or question in dispute, or on the party against whom judgment would be given, according to the presumption recognized by the law of evidence if no proof were adduced on either side. Accordingly it almost always rests on the plaintiff or pursuer in an action, or on the party asserting the facts on which the result of the litigation must depend. There may, however, be such a legal presumption in favor of the pursuer that the burden falls on the defender. The burden of proof is said to be shifted when the party upon whom it lay has produced sufficient evidence to turn the presumption in his favor.

**BURDETT-COUTTS**, ANGELA GEORGIANA, the Right Honorable baroness, English philanthropist, daughter of Sir Francis Burdett, born April 21, 1814. In 1837 she inherited much of the property of her grandfather, Thomas Coutts, the banker, and the liberal and philanthropic use she made of this wealth has rendered her name deservedly popular. Among her numerous public charities may be mentioned the erection and endowment of several churches and schools, and the endowment of the three colonial bishoprics of Cape Town, Adelaide, and British Columbia; the establishment of a shelter and reformatory for fallen women; and the erection of Columbia Square, consisting of model dwellings at low rents for about 300 families. Her private charities have been on a corresponding scale, and she is also a liberal patroness of art. In 1871 she accepted a peerage from Government. In 1872 the freedom of the city of London was conferred upon her; in 1874 that also of Edinburgh. In 1881 she was married to Mr. William Ashmead-Bartlett, who in 1882 obtained the royal license to assume her name, and who in 1885 was elected to Parliament as Conservative member for Westminster.

**BURDETTE**, ROBERT JONES, humorist and lecturer, born in Greensborough, Pa., July 30, 1844. He was educated in the public school of Peoria, Ill., and in 1862 enlisted as a private in the 47th Illinois volunteers, and served through the war. He was connected with the "Peoria Transcript" in 1869, afterwards with the "Review," and later he started with friends a new paper, which was unsuccessful. He became associate editor of the "Burlington Hawkeye," of Iowa, and his humorous sketches in this paper were widely copied, and made him known to the newspaper-reading world. His fun was never coarse or vulgar. In 1877 he began to deliver lectures, which were only moder-

ately successful, and most of which have since been compiled with fugitive pieces and published in book form; as, *The Rise and Fall of the Mustache*, and *Other Hawkeye Terms*, Buckeyes, *Life of William Penn*. He has recently been licensed by the Baptist denomination to preach, and during vacation trips has supplied destitute country churches.

**BURDOCK**, the common name of a genus of the natural order *Compositæ*, familiarly characterized by the bracts of the involucre, which are hooked inwards at the tip. By means of these hooks the flower-head, popularly called a *bur*, readily adheres to clothing, the wool of sheep, or the like, and in this way the seeds are transported from one place to another. The common burdock, *Arctium lappa*, is a native of the Old World, but is widely naturalized in America. The root is a diaphoretic and diuretic, and is used as a remedy for rheumatism, cutaneous diseases, etc. The young shoots are cultivated in Japan for culinary purposes. See *Britannica*, Vol. XXIII, p. 307.

**BUREAU**, a French word signifying a writing-table or desk with drawers for papers. In the United States it is applied to a chest of drawers for holding clothing and other articles. Bureau is also an office, a department of government, or the officials that carry it on. In England the term is confined to subordinate departments, and in the United States to certain sub-divisions of some of the executive departments.

**BUREAUCRACY**, a name often given to signify a government where the administration is centralized in regularly graded series of government officials, who are responsible only to their chiefs, and who interfere with and control every detail of public and private life.

**BURGAS**, a port of Eastern Roumelia, situated on the Gulf of Burgas, 76 miles northeast of Adrianople. It has a trade in agricultural produce, and sends large quantities of clay to the Turkish pipe-makers. Population, 5,000.

**BURGESS**, EDWARD, naval architect, born at West Sandwich, Mass., June 30, 1848. He was a Harvard graduate and afterwards instructor at that college in the entomological department. He spent some time traveling in Europe, began the study of naval architecture, and engaged in building boats. He was the builder of the yachts *Puritan* and *Mayflower*, which in the international races of 1885 and 1886 won, respectively, the races with the English *Genesta* and *Galatea*.

**BURGLARY**. (See *Britannica*, Vol. IV, p. 534.) In the United States, the common-law ingredients of burglary have been somewhat modified by statute. In some of these the definition is extended so as to include breaking and entry in the daytime; in others, buildings other than dwelling-houses are included. Some laws even include in their definition the breaking out of a building, as well as into it. The laws of the different States adhere in general to the principles of the common law, but vary widely in detail, both as to the crime itself and its penalty.

**BURGLEN**, a village of Switzerland, situated in the canton of Uri, about a mile from Altorf. It is the traditional birthplace of William Tell. The supposed site of the patriot's house is now occupied by a chapel, erected in 1522, upon the walls of which are represented certain well-known scenes from his history.

**BURGOMASTER**, the Anglicized form of the Dutch *burgemeester* (German, *burgermeister*), the title of the chief magistrate of a municipal town in the Netherlands, Germany, and other Teutonic countries. It is analogous to the French *maire*, English *mayor*, and Scotch *provost*. The German

governments usually retain the right to confirm or reject the elected burgomaster.

**BURGUNDY PITCH**, a resinous substance prepared from common frankincense (the spontaneous exudation of the Norway spruce-fir, *Abies excelsa*) by melting it in hot water, by which means it is freed from a considerable part of the volatile oil which it contains. See *Britannica*, Vol. IX, pp. 223, 711.

**BURGUNDY WINES**, a class of wines produced in Burgundy, in France, chiefly the produce of vineyards cultivated on the hilly lands forming the Côte-d'Or (see *Britannica*, Vol. XIV, p. 606). They share with the Bordeaux wines the reputation of including the finest wines made.

**BURIN**, the principal instrument used in engraving. It is made of tempered steel, and is of prismatic form, the graving end being ground off obliquely to a sharp point. The distinctive style of a master is frequently described by such expressions as a *soft burin*, a *graphic burin*, or a *brilliant burin*. See *Britannica*, Vol. VIII, p. 439.

**BURION**, the house-finch, *Carpodacus frontalis*, a fringilline bird common in the southwestern parts of the United States. The name is of uncertain origin, but is supposed to be a corruption of the Spanish-Mexican *gorrion*, a sparrow.

**BURITI PALM** (*Mauritia vinifera*), one of the largest of the South American palms, often attaining a height of 125 feet. It grows in the swamps from Southern Brazil to the West Indies. Cords are made of the fibers from the young leaves, and the pith of the leaf-stem is utilized as cork. The abundant sweet sap is drunk fresh or is fermented into palm wine by the natives. Hence the name *wine palm*, commonly given to the tree. A single bunch of the sago-like fruit frequently weighs over a hundred pounds. The pulp and seed of this fruit are eaten and made into sweetmeats. *Mauritia flexuosa*, the *moriti*, or *sea palm* of Trinidad and Brazil, is of similar appearance and uses; but its leaves yield better fiber, and its stem a useful wood.

**BURKE**, WILLIAM (1792-1829), born in 1792, became notorious through his partnership with William Hare in a series of infamous murders committed in Edinburgh. Toward the close of 1827 they sold for dissection to Dr. Robert Knox, the body of an old pensioner who had died in the house, and the ease and safety with which they had earned this money tempted them to commit murder to procure more bodies. They inveigled unknown travelers into the lodging-house, made them drunk, and then suffocated them in such a way as to leave no marks of violence, receiving for the bodies sums of money varying from \$40 to \$70. They had murdered 15 persons in this way when they were discovered by the police. Hare, the more execrable wretch of the two, was admitted king's evidence, while Burke was hanged Jan. 28, 1829. His abhorred name has added a word to the English tongue: *burke*, to smother; to get rid of by indirect means.

**BURLEIGH**, WILLIAM HENRY, born in Woodstock, Conn., Feb. 2, 1812, died in Brooklyn, N. Y. March 18, 1871. He early entered a printing office where he learned type-setting and wrote for the press. From 1832 to 1835 he was in charge of newspapers which advocated reforms. His principles were in favor of peace and temperance, and against slavery. He was more than once the object of mob violence. He was editor of the "Prohibitionist." In 1855 he became harbor-master of the New York port, which office he held for 15 years. A collection of his poems which had appeared in his newspapers was published in book form. His wife, *Celia*, was born in Cazenovia,



N. Y., in 1825, died in Syracuse, July 26, 1875. Mr. Burleigh was her third husband, she having been divorced from C. B. Kellum and later from Charles Chauncy Burr. After Mr. Burleigh's death she studied theology, entered the Unitarian ministry, and was pastor of a church in Brooklyn, Conn., till her health failed.

**BURLINGAME, ANSON**, born in New Berlin, N. Y., Nov. 14, 1820, died in St. Petersburg, Russia, Feb. 23, 1870. He graduated at Harvard law-school in 1846, practiced law in Boston, and was elected to the legislature. In 1854 he was sent to Congress, where he became known as an able debater and an opponent of slavery. For his severe denunciation of Brooks's assault on Sumner he was challenged to fight a duel (see Brooks, PRESTON S., in these Revisions and Additions). President Lincoln sent him to China in 1861 as United States minister, and at the expiration of his term Prince Kung, regent of the empire, appointed him special envoy to the United States and the principal European powers to make an amicable treaty with those nations—an honor never before conferred upon a foreigner. In 1868 the "Burlingame Treaty" was signed at Washington, being the first official acceptance, on the part of China, of the principles of international law. Mr. Burlingame then visited England, Denmark, Sweden, Holland and Prussia in diplomatic missions, and in 1870 reached St. Petersburg, where he died before transacting the official business which he had in hand.

**BURLINGTON**, a city of Iowa, located on the west bank of the Mississippi River, and on the main line of the Chicago, Burlington & Quincy railroad, and on six other railroads. The manufacturing and jobbing business is compactly gathered in the valley adjacent to the railroads and river, while for the most part the residences are spread over three hills that rise above the valley. The Mississippi is crossed here by a railroad bridge. The streets are paved with brick, granite and macadam pavement, and are lighted with gas and electricity. There are twenty-five miles of street railway operated by electricity. The mains of a steam-heating company, extending through the business portion, supply steam heat abundantly. The city is well supplied with water from the river by the Holly system. Among the principal buildings are a government building costing \$100,000, and an opera house costing \$90,000. There is also a charity hospital, a free circulating library of 10,000 volumes, numerous public and denominational schools, and a business college. The city has a free-delivery post-office, a telephone exchange, and an excellent fire department. The advantages of river and railroad transportation have aided in building up an extensive manufacturing business. Population in 1880, 19,450; in 1890, 22,528. See Britannica, Vol. IX, p. 551.

**BURLINGTON**, a city of Kansas, county-seat of Coffey county. It is situated on the Neosho River, about sixty miles south of Topeka. The river furnishes an abundant water-power, and the city contains several mills and factories.

**BURLINGTON**, a city of Vermont, the largest, in respect of population, in the State. It is a port of entry, and has a good harbor, well protected by a breakwater constructed by the United States Government. The Vermont Central Railroad connects this city with Rutland, Montpelier, and Ogdensburg, N. Y. That portion of the city lying near the lake is not much above the water, but the largest part is on ground elevated about 300 feet above the lake, thus affording fine views of the surrounding country and of the Adirondack Mountains beyond. In the center of the city is a handsome square. Bow-

dering which are the post-office, court-house, and large hotels. Among the institutions of learning are the Vermont Episcopal Institute, the State Agricultural College, founded in 1885, and the University of Vermont. This latter institution, founded in 1800, is not sectarian, and is open to both sexes. It occupies four large buildings on an elevated site, and has connected with it a medical college. The city contains a free library, with over 12,000 volumes. Here also is an orphan asylum and a hospital founded by Miss Mary Fletcher, and costing \$175,000. Burlington abounds in manufactories, and is one of the most extensive lumber markets in the United States. Population in 1880, 11,865; in 1890, 14,566. See Britannica, Vol. IV, p. 550.

**BUR-MARIGOLD** (*Bidens*), the book-name of a coarse worthless weed commonly called *beggar's-ticks*, or *beggar's-lice*.

**BURMEISTER, HERMANN**, zoölogist born in Stralsund, Germany, Jan. 15, 1807. He occupied the chair of zoölogy at Halle; was deputy to the national assembly of Prussia; traveled in Brazil for two years, and was made director of the Museum of Natural History at Buenos Ayres, and head of the Academy of Sciences in the National University of Cordoba, Argentine Republic. He has published many scientific works, among which are: *Treatise on Natural History*; *Manual of Entomology*; *The History of Creation*; and *The Animals of Brazil*.

**BURNABY, FREDERICK GUSTAVUS** (1842-85), a daring traveler and dashing *sabreur*, born at Bedford, England, March 3, 1842. He was educated at Bedford, Harrow, and in Germany, and early became an accomplished linguist. He joined the Royal Horse Guards in 1859, became captain in the regiment in 1866, lieutenant-colonel in 1880, and colonel in 1881. His travels in Central and South America; his experiences in the Carlist camp in 1874, and with Gordon in the Soudan in 1875, fitted him for his most notable exploit, the ride to Khiva, in the winter of 1875, across the steppes of Tartary. His *Ride to Khiva* (1876), written in a bright and pleasing style, made him famous; and indeed his fine physique, reckless courage, and outspoken frankness of manner admirably fitted him to be a hero of the English people. In 1876 he traveled in Asia Minor and Armenia, publishing on his return, *On Horseback Through Asia Minor*, which was no less popular than his first venture. He was attached to the Intelligence Department in Graham's expedition to Eastern Soudan, and was wounded at El Teb. In 1884 he joined Sir Herbert Stewart's column in the Nile expedition, and was killed by an Arab spear-thrust in the battle of Abu-Klea, Jan. 17, 1885. Burnaby was a daring aeronaut, and crossed the Channel to Normandy in 1882 in the balloon *Eclipse*.

**BURNAND, FRANCIS COWLEY**, English author and dramatist, born Nov. 29, 1836. He was educated at Eton and Trinity College, Cambridge (1854-58), and afterwards went to Cuddesdon Theological College with a view to becoming a clergyman of the Church of England. In December, 1858, he joined the Roman Catholic Church, and for four months continued his studies at the house of the Oblate Fathers at Bayswater. He was called to the bar in 1862, but the success of some early dramatic ventures altered his plans. He joined H. J. Byron in starting "Fun," but left that paper for "Punch," then edited by Mark Lemon. His first contribution to "Punch" was *Moheanna*, a burlesque on sensational romance writing; soon after appeared *How, When and Where*, followed by the now well-known *Happy-Thoughts*, which in book form soon ran through over sixteen editions. Later, he continued the *Happy Thoughts* series, and wrote

a series of burlesques of popular novelists—that on Ouida's style, *Strapmore*, being perhaps the happiest. Burnand has been editor of "Punch" since 1880.

**BURNE-JONES, EDWARD, A. R. A.**, born at Birmingham, England, of Welsh descent, Aug. 28, 1833. He was destined for the church, and educated at Exeter College, Oxford, but his love of art asserted itself, and he received from Rossetti encouragement and guidance in his attempts as a painter. From the first he was a fine colorist, and his earlier works attain in water-color greater brilliancy and purity of hue than is usual even in oil. It was not until 1870 that he began to be known as an oil-painter. Among his pictures are *The Days of Creation* and *The Mirror of Venus* (1877); *Le Chant d'Amour* (1878); *The Golden Stairs* (1880); *The Tree of Forgiveness* (1882); *King Cophetua* (1884), and *The Brazen Tower* (1888). In his later works his coloring tends to become less splendid, inclining to restrict itself to curiously varied tones of bluish purple and ruddy bronze. He has furnished many striking designs for stained glass.

**BURNET, JOHN**, painter, engraver and author, born at Fishierrow, near Edinburgh, Scotland, in 1784, died at Stoke Newington, April 29, 1868. He first became known through his admirable engravings of Wilkie's works. Of his paintings the best known is the *Greenwich Pensioners* (1837). He was author of several books on art, the most important being a *Practical Treatise on Painting*; he was also author of *Rembrandt and His Works* (1849), and, in conjunction with Cunningham, of *Life and Works of Turner* (1852).

**BURNET**, the common name of species of *Poterium*, natural order *Rosaceæ*. Great burnet, *Poterium officinale*, is common in meadows in all parts of Europe, and is cultivated in Germany for fodder. The root-stalk is astringent, and was formerly used in medicine. Common burnet, *Poterium sanguisorba*, grows on chalky soils, and has also been cultivated as a fodder plant. It grows wild in the United States.

**BURNET-SAXIFRAGE** (*Pimpinella saxifraga*), an umbelliferous plant, which, on account of its similar foliage, habit, use as fodder, and (more distinctly) astringent root-stalk, has been associated or confused with burnet from the earliest times.

**BURNETT, FRANCES HODGSON**, author, born in Manchester, England, Nov. 24, 1849. Her parents emigrated to America and settled in Knoxville, Tenn. Two years afterward the daughter began to write short stories for magazines and in 1872 a story from her pen was published in "Scribner's Monthly." After her marriage to Dr. Luan M. Burnett, of Knoxville, she visited Europe, and, on her return took up residence in Washington, D. C. Among her stories are *That Lass o' Lowrie's*; *Polly Pemberton*; *Haworth's Louisiana*; *A Fair Barbarian*; *Through One Administration*; *Little Lord Fauntleroy*; *Sara Crewe*; and *Little St. Elizabeth*.

**BURNETT'S LIQUID**, a solution of zinc chloride introduced by Sir William Burnett (1779-1861) for the purpose of disinfecting ships, hospitals, etc. It is of service in preserving dead animal tissues, as in the dissecting room, and in jars containing anatomical specimens. When added to bilge or sewage water as a deodorizer, it mainly acts by decomposing the offensive sulphide of ammonium. Burnett's liquid has also been applied to the preservation of timber from the ravages of dry-rot, and the process of so treating wood is called *Burnettizing*.

**BURNHAM, GORDON WEBSTER**, born in Hampton, Conn., March 20, 1803, died in New York city,

March 18, 1885. He became interested in the manufacturing industries of Waterbury, Conn., and was member of the firm of Benedict & Co., which made brass goods. After earning a large fortune the firm dissolved, and he became successively the president of the Waterbury Clock Co., the Waterbury Watch Co., the Waterbury Brass Co., and the American Pin Co. Mr. Burnham presented to New York city a statue of Daniel Webster, erected a statue to his father-in-law, Bishop Brownell, and his own monument, erected some time before his death, is among the finest in Greenwood Cemetery.

**BURNHAM BEECHES**, the remains of an ancient forest in Buckinghamshire, England, 25 miles northeast of London. The London Corporation purchased the surrounding 374 acres in 1879, and set them apart for public use Oct. 3, 1883. Many of these beeches are of immense size.

**BURNING BUSH** (*Euonymus atro-purpureus*), a small ornamental shrub of North America, with oblong leaves, and bright crimson, pendulous, four-lobed, smooth capsules; its congener, *Euonymus Americana*, has scarlet, prickly capsules. The French *Buisson ardent* is a red hawthorne (*Crataegus pyracantha*). The plant *Dictamnus fraxinella* is called burning bush because its secretions render the surrounding air inflammable in hot weather.

**BURNS, ANTHONY**, fugitive slave, born in Virginia about 1830, died in St. Catharine's, Can., July 27, 1862. He escaped to Boston, where he found work during the winter of 1853-54. After the passage of the Kansas-Nebraska bill, Burns was arrested under the provisions of the fugitive slave act by United States Marshal Watson Freeman, on the warrant sworn out by Charles F. Suttle. The arrest created much excitement, as Boston was the center of the anti-slavery sentiment. A mass-meeting was called in Faneuil Hall. During its progress an unsuccessful raid was made on the court-house, led by Col. Thomas W. Higginson, to rescue Burns, and several persons were injured. The next day the court decided that Burns must be returned to his master. He was to be taken to Virginia in the revenue cutter *Morris*, and an immense crowd followed him to the wharf. So strong was popular feeling that a riot was feared, till Rev. Daniel Foster exclaimed, "Let us pray!" The crowd was instantly subdued and stood in silence with uncovered heads, while Burns was hastily transferred to the ship. Afterwards Burns studied at Oberlin College and became a Baptist minister. He settled in Canada, where he was pastor of a colored church.

**BURNS, FRANCIS, M. E.** bishop, born of free colored parents in Albany, N. Y., Dec. 5, 1809, died in Baltimore, Md., April 18, 1863. When fifteen years old he was converted and studied for the ministry, showing such ability in his work among his own people that he was sent in 1834 on the Liberian mission. Here he remained for ten years. In 1844 he visited the United States, and was ordained deacon in Brooklyn and elder in Mulberry Street Church, New York city; he returned to his work in Africa, where he was made presiding elder of Cape Palmas district, and opened an academy at Monrovia. He was made superintendent of missions, and on his second return to the United States was ordained missionary bishop. After five years more in Africa, he returned to the United States on account of ill-health.

**BURNS, REV. JABEZ, D. D., LL. D.**, Baptist minister and prolific religious writer, born at Oldham, near Manchester, England, Dec. 18, 1805, died in Paddington, Jan. 31, 1876. He was educated at



Chester and at Oldham Grammar-School, uniting at an early age with the Methodist New Connection. At the age of twenty-one he removed to London, where he published his first two works, *The Christian Sketch-book* and *The Spiritual Cabinet*, both of which were popular. After exercising the functions of the ministry at Perth (1830-35), he returned to London to take charge of a General Baptist congregation in Marylebone, and subsequently lectured in all parts of the United Kingdom on temperance, abolition of capital punishment, etc. He received the degrees of D.D. and LL.D. from American colleges during his visits to this country in 1847 and 1872. In 1869 he visited Egypt and Palestine. He was the author of more than thirty separate works. One of them, *Sketches and Skeletons of Sermons* (15 volumes), reached a 14th edition.

BURNS, JOHN, born in Burlington, N. J., Sept. 5, 1793, died in Gettysburg, Pa., Feb. 7, 1872. He was one of the first volunteers of the war of 1812, and served at Plattsburg, Queenstown and Lundy's Lane. He was a volunteer of the Mexican war, and, when he offered his services on the outbreak of the civil war, he was not accepted on account of his age, but was given the place of teamster, and whenever an engagement took place he would borrow a gun so as to take part. He was finally discharged from the service on account of infirmities, but was chosen constable of Gettysburg. In June, 1863, when the Confederate scouts approached the town, he met them with a company of volunteers. June 26 the Confederates held possession, and John Burns was locked up for exercising his authority in opposition to the Confederate officials. The Southern army went on toward York, and Burns, now being at liberty, began to arrest Confederate stragglers and scouts. On the 28th the Union army came to the assistance of the veteran who, almost single-handed, had been contending against the Army of Northern Virginia. When the battle of Gettysburg was fought, Burns borrowed a gun from a wounded Union soldier and went into the thickest of the engagement. He was wounded and fell into the hands of the Confederates, to whom he told a plausible story, and then managed to be taken to his own house for medical treatment. He had a narrow escape from being shot for not wearing the army dress (Federal), but on the following day the Union army drove the opposing forces from the field, and John Burns was again in the hands of friends. The story of his patriotism was appreciated in the Northern States, and visitors to the field of Gettysburg substantially remembered him. In his last years his mental faculties became clouded, and he frequently wandered from home. One cold night in December, 1871, he was found in a destitute condition, wandering about in New York city. His wants were supplied and he was taken home, but died soon after from pneumonia.

BURNSIDE, AMBROSE EVERETT, an American general. See *Britannica*, Vol. XXIII, p. 788.

BURNT STONES, antique carnelians sometimes found in ancient ruins, and seeming to have been acted upon by fire, having a dull appearance externally, but exhibiting a beautiful red color when held up to the light. When ornamented with fine engraving they bring a high price.

BURR, AARON, statesman, born in Newark, N. J., Feb. 6, 1756, died on Staten Island, N. Y., Sept. 14, 1836. His father, Aaron Burr, was president of Princeton College, and his mother was Esther, daughter of Jonathan Edwards. His parents died when he was very young, and himself and sister

Sarah were cared for by their uncle, Rev. Timothy Edwards, of Elizabeth, N. J. The children possessed an abundant fortune and were well educated.

As a lad Aaron was small and very handsome; with black eyes, fascinating manners and a precocious intellect. At the age of 11 he was sufficiently advanced in his studies to enter Princeton, but was not allowed to do so on account of his youth. Two years later he entered, and graduated in 1772. About the time of his leaving college a religious revival was in progress, and young Burr went to the president Dr. Witherspoon, for help in his mental difficulties. The doctor called the excitement fanatical, but Burr was not content, and went to live in the family of Dr. Bellamy with the purpose of settling his convictions in regard to Christianity. To the surprise of his friends he became an infidel, and adopted the Lord Chesterfield code of manners and morals.

In 1774 Burr resided with his brother-in-law, Tapping Reeve, and studied for the legal profession. The following year he entered the Revolutionary Army at Boston, accompanied Benedict Arnold to Quebec, and returned from the expedition with the rank of major and a high reputation for military daring. He became for a few weeks a member of Washington's family, but each came to dislike the other, and Burr withdrew and attached himself to General Putnam as aide. Burr was promoted to the rank of lieutenant-colonel and fought at Hackensack and Monmouth. After four years of service he resigned his commission on account of ill health, and after a period of rest resumed the study of law.

He opened an office for practice in Albany, and in the same year (1782) married Mrs. Theodosia Prevost, widow of an English officer. The next year he moved to New York city, lived in magnificent style, entertained Talleyrand, Louis Philippe and other famous guests; entered political life, and ranked among the leading lawyers of the city—Alexander Hamilton being his sole rival.

In 1791 Burr was elected to the United States Senate, and afterwards to the New York legislature. Jefferson and Burr stood highest in the presidential campaign of 1800, each candidate receiving 73 votes. This threw the choice into the House, where, after a week's debate, Jefferson was chosen President and Burr Vice-President. Burr had grown unpopular with his party, as his election to the Senate and also to the Vice-Presidency had a somewhat mysterious, not to say dishonest, look. To clear away suspicion he offered himself as candidate for governor of New York. In the contest he was beaten by Morgan Lewis; for Alexander Hamilton, whose father-in-law Burr had outstripped in the senatorial race in 1791, exerted his powerful influence in the campaign, and warned the party to distrust him. Burr made Hamilton's speeches the excuse for challenging him to fight. Hamilton endeavored to avoid this extremity, but finally accepted, and the duel took place at Weehawken, N. J., July 7, 1804. Hamilton was killed, and Burr indicted for murder. He fled for safety to his daughter's home in South Carolina, and after the excitement died down, engaged in a mysterious project which was nothing less than the conquering of Texas, and possibly Mexico; the founding of a republic with himself at the head and New Orleans as his capital; the Western States might eventually leave the Union and join his republic. When events were almost ripe for testing the plan, the President denounced the scheme (1806), and it fell through.

Burr was tried the following year on a charge of treason, but was acquitted on some technicality.

His duel with Hamilton had spoiled his political prospects, and now his name was branded as that of a traitor. He sailed to England, but was from there expelled; went to Sweden, Germany and France, and in every place was under the watchful eyes of government officials. He was forbidden to return to America, but after living in great poverty in London, whither he had again returned, he came to the United States in the disguise of wig, whiskers, strange garments and the assumed name of Arnot. He reached Boston in 1812, then drifted to New York, and finally ventured to open a law office on Nassau street. Here he lived for 23 years, and although shunned by society, whose favorite he had been, he built up a good practice.

Two great misfortunes befell him: his only grandchild, a boy 11 years of age, died, and his idolized daughter, Theodosia, was lost at sea. When 78 years of age (his first wife having died in 1794) he married Madame Jumel, the wealthy widow of a French merchant. His reckless expenditure of her fortune brought about a separation, and in his last days an old Scotch woman, a former friend, gave him a home. Burr died at Port Richmond, Staten Island, and was buried, according to his own wishes, in the Princeton Cemetery, near the graves of his father and grandfather.

BURR, THEODOSIA, only daughter of Aaron Burr and his wife, Mrs. Theodosia Prevost, born in New York city in 1783; lost at sea in January, 1813. She was a brilliant and highly accomplished woman, for her father superintended her education, carefully developing her mental and physical qualities and training her to independence of thought and self-reliance. She married Joseph Alston (1801), afterwards governor of South Carolina. She and her father were passionately fond of each other, and her faith in him remained unshaken through all the misfortunes which he brought upon himself. Burr's scheme to become emperor of Mexico was known by herself and husband, and it was even planned that her only child, a son, would be heir-apparent to the throne. On her father's trial for treason at Richmond, she appeared in court, and her beauty and graces were not without effect, both on jury and spectators, in securing a favorable verdict and modifying popular indignation. She wrote eloquent letters to Mrs. Madison, Secretary Gallatin, and former friends of her father while he was in exile, and thus made it possible for him to return to the United States. The death of her only child was a terrible blow, and made her ill with a fever; but learning that her father had arrived in America, she left Charleston on the pilot-boat *Patriot*, and started for New York. A storm off Cape Hatteras probably capsized the boat, for it was never heard of again.

BURRA-BURRA, the name of a famous copper mine in South Australia, 101 miles northeast of Adelaide, discovered in 1844. See *Britannica*, Vol. III, p. 109; Vol. XXII, p. 284.

BURRARD INLET, a narrow inlet in the southwest corner of British Columbia, a little north of the mouth of the Fraser River. It is nine miles in length, and forms one of the finest harbors on the Pacific coast, being easy of access for the largest ships. It has become of much more importance since the opening of the Canada Pacific Railway, whose terminus is at Vancouver on the north shore of this inlet.

BUR-REED, the popular name of a species of *Sparganium*, closely allied to the bulrush, and of similar habitat and distribution, so called from its reed-like leaves and bur-like heads of fruit. See *Britannica*, Vol. XX, p. 319.

BURRIANA, a town of Spain, 34 miles north of Valencia, on the Mediterranean. Population, 10,058.

BURRITT, ELIHU, a prominent advocate of the principles of the Peace Society, and widely known as the "Learned Blacksmith," born in New Britain, Conn., Dec. 8, 1810, died there March 6, 1879. His father was a shoemaker, and the boy learned the trade of a blacksmith, which he pursued in his native place and in Worcester, Mass., to which town he removed. All his leisure was devoted to study, especially of mathematics and languages. In the latter he achieved a very wide range, but is even better known to the world as an earnest advocate of peace than as a scholar. At Worcester he edited the "Christian Citizen," advocating the peaceful settlement of international questions, and the doctrine of "universal brotherhood," and he traveled much in Europe and America lecturing and working in other ways for the extension of his views on peace, temperance, self-culture and the emancipation of the slaves. In 1865 he was appointed United States consul at Birmingham, England. Among his published works were: *Sparks from the Anvil*; *Olive Leaves*; *Hand-book of the Nations*; *A Walk from John O'Groats to Land's End*; *The Mission of Great Suffering*; *Walks in the Black Country*; *Ten Minute Talks*; and *Chips from Many Blocks*.

BURROUGHS, JOHN, born in Roxbury, N. Y., April 3, 1837. He was a farmer's son, received an academic education, became a New York journalist, was a treasury clerk in Washington, D. C., from 1864 to 1873, and afterwards examiner of national banks. In 1874 he settled on a farm near Esopus, N. Y., and has devoted his time to fruit culture and literature. A close observer and enthusiastic lover of Nature, his published essays make delightful reading. Among them are: *Wake Robin*; *Winter Sunshine*; *Birds and Poets*; *Locusts and Wild Honey*; *Pepacton*; *Fresh Fields*; and *Signs and Seasons*.

BURSARY, in the universities and colleges of Scotland, the annual proceeds of a sum permanently invested for the maintenance of a student. Elsewhere the term is applied to the treasury of a college or monastery.

BURSCHEID, a manufacturing town of Prussia, situated on the Wupper, 20 miles southeast of Düsseldorf. Population, 6,828.

BURSCHENSCHAFT, the name of a famous association of German students, at one time prominent in the politics of the Fatherland. It was founded at Jena in 1813, and composed of students who had fought in the great war of liberation. The *Burschenschaft* aimed to cherish the higher ideals of patriotism, and especially of German national unity. In the time of reactionary policy, the club was suspected of revolutionary tendencies, and in 1819 was dissolved by the Prussian and other governments.

BURTON, SIR FREDERIC WILLIAM, water-color painter, born in County Clare, Ireland, in 1816, and educated at Dublin. In 1856 he became a member of the Society of Painters in Water-Colors, and in 1874 director of the National Gallery. In 1884 he was knighted.

BURTON, JOHN HILL, historian, born at Aberdeen, Scotland, Aug. 22, 1809, died Aug. 10, 1881. He graduated at Marischal College, Aberdeen; was articled to a lawyer, and came to the Edinburgh bar, but subsequently devoted himself chiefly to study and letters. He was appointed secretary to the Prison Board of Scotland, and became one of the prison commissioners. He held the old office of Historiographer Royal for Scotland. Among his original works may be mentioned *Life of Hume*



(1846), *Political and Social Economy* (1849), *History of Scotland from the Revolution to the Extinction of the Last Jacobite Insurrection* (1853), *The History of Scotland from Agricola's Invasion to the Revolution of 1688* (1867-70), *The Book-Hunter* (1862), *The Cairn-gorm Mountains* (1864).

BURTON, SIR RICHARD FRANCIS, the son of Colonel J. N. Burton, and one of the most daring and successful of modern travelers, born in 1821 at Barham House, Hertfordshire, England, died at Trieste, Austria, Oct. 20, 1890. He was educated in France and England, and in 1842 he entered the Indian service, and served in Sind under Sir Charles Napier. In 1851 he published his first important work on *Sindh*. Burton acquired a very familiar acquaintance with Hindustani and Persian, and learned to speak Arabic like a native.

Burton resolved to explore Arabia in the disguise of an Afghan pilgrim, and after a visit to England in 1851 he set out on his journey. His *Personal Narrative of a Pilgrimage to El Medinah and Mecca* (1855; new edition, 1879-80) records one of the most daring feats on record.

His next journey was into the country of the Somalis, in Eastern Africa. He was chief of the staff to General Beaton in the Crimea. In 1856 he set out in company with Speke on the journey which led to the discovery and exploration of the great lake of Tanganyika, and afterwards traveled in North America.

In 1861 Burton married, and was appointed consul at Fernando Po; and while holding this appointment he visited the Cameroon Mountains, and went on a mission to the king of Dahomey. He was subsequently consul at Santos in Brazil, and at Damascus; and in 1872 he succeeded Charles Lever in the post of British consul at Trieste. In 1876-78 he paid two visits to Midian. In 1882 he visited the gold-producing country of the Guinea coast, along with Captain Cameron. He received the gold medal of both the English and French geographical societies, and was knighted in 1886. He was master of 35 languages and dialects.

Lady Burton was the companion of his wanderings after 1861, and has written a narrative of travel, *Inner Life of Syria, Palestine, etc.* (1875), and *Arabia, Egypt, India* (1879). Among Burton's many works are: *First Footsteps in East Africa* (1856), *The Lake Regions of Central Africa* (1860), *Wanderings in West Africa* (1863), *The Nile Basin* (1869), and works on Goa, Abbeokuta, Paraguay, Brazil, Syria, Iceland, etc., as well as several translations.

BURTON, WILLIAM EVANS, English playwright and comedian, born in London, Sept. 24, 1804, died in New York, Feb. 10, 1860. His father was a printer, and at his death the son attempted to support his mother and carry on the printing business, although but eighteen years of age. Failing in this he drifted into the dramatic profession, and made his first appearance in a London theater in 1831, in *The Lottery Ticket*, and in 1833 his play *Ellen Wareham* was performed in five London theaters on the same night. He came to the United States in 1834, and spent four years in Philadelphia. Subsequently he appeared in New York in James W. Wallack's theater, playing *John Jones*, for the benefit of Samuel Woodworth, author of *The Old Oakon Bucket*.

Burton opened a theater of his own in New York in 1848. He had a strong force of actors, among whom were John Brougham, John Lester Wallack, Charles Fisher, Mrs. Skerrett, Mrs. Rhea, Mary Devlin, Fanny Wallack and Mrs. Hughes. Mr. Burton excelled as a low comedian, although he preferred the tragic parts. His most brilliant hits were in the characters of Sir Toby Belch, Micawber,

Sam Weller, Captain Cuttle, Bottom, Mr. Toodles, Jeremiah Clip, Touchstone and Falstaff. For eight years he conducted this Chambers street theater, then for two years had the management of the Metropolitan (afterwards Winter Garden).

Burton's last performance was in December, 1859, in Hamilton, Can. Mr. Burton played in 184 characters; in the character of Toodles he acted 640 times. He wrote *The Actor's Alloguy*, and *Wageries and Vageries*, edited "Literary Souvenir," established "The Gentleman's Magazine," published *Cyclopædia of Wit and Humor*, and collected a fine library, particularly rich in Shakespearean literature.

BURYING BEETLE (*Necrophorus*), the common name of insects of the family *Silphidae*, remarkable for their habit of burying the bodies of mice, moles and other small animals, in which they have deposited their eggs. The known species are mostly natives of Europe and of North America. See *Britannica*, Vol. VI, p. 130.

BUSACO, a ridge (1,826 feet) on the north side of the river Mondego, in the Portuguese province of Beira. Here Wellington, with 40,000 British and Portuguese troops, repulsed the attack of Massena with 65,000 French, Sept. 27, 1810.

BUSBY, a military head-dress worn by hussars, horse artillerymen and engineers in the British army. It consists of a fur hat with a short bag hanging down from the top on its right side, of the same color as the facings of the regiment, and an upright plume in front. The origin of the name is obscure, but seems to be Hungarian, and it is said that the bag is a relic of a Hungarian head-dress, from which a long padded bag hung down over the right shoulder to ward off sword-cuts.

BUSCH, JULIUS MORITZ, a German writer, born in Dresden in 1821. His literary works consist of numerous translations into his own language of the writings of popular American and English authors, of entertaining accounts of his own extensive travels, and of political essays on his own and other countries. During the Franco-Prussian war he was in close relationship with Bismarck; and his diary kept during the campaign has been translated into English, French, Dutch, Swedish and Russian.

BUSH ANTELOPE, also called Bush Buck and Bush Goat, names common to a number of species of the genus *Tragelaphus*, natives chiefly of the southern and western parts of Africa. They are animals of more compact form, shorter limbs, and greater strength, but much less agility, than the true or typical antelopes. They frequent jungles, thick forests, and beds of reeds, and when pursued seek to escape by diving into a thicket.

BUSHEL, a dry measure containing eight gallons or four pecks. In Great Britain the Winchester bushel (so called because the ancient standard bushel measure was preserved in the town-hall of Winchester) was the standard measure from Anglo-Saxon times until the imperial bushel was legally established in 1826; its capacity was 2,150.42 cubic inches. The capacity of the imperial bushel is 2,218.192 cubic inches, and contains 80 pounds avoirdupois of distilled water, at the temperature of 62° F., with the barometer at 30 inches. Measures of capacity in the United States are founded on the Winchester bushel. Various weights of different commodities have been made bushels by law, and vary considerably in different States.

BUSHNELL, DAVID, born at Saybrook, Conn., in 1742, died in Warrenton, Ga., in 1824. He was a graduate of Yale in 1775. His mind was of an inventive turn, and during his college course he was

at work constructing a torpedo for the destruction of ships. He built the *American Truth*, an iron-plate diving boat to carry one man who should guide himself to the vessel belonging to the enemy and thereto fasten the Bushnell torpedo, which was regulated by clockwork to explode at a given time. In 1777 he successfully tested his invention, and with it blew up a British schooner in New York harbor. The following year he sent a fleet of barrels down the Delaware to destroy the British ships. The scheme was not entirely successful, but the next day they exploded and blew up one boat. *The Battle of the Kegs*, a humorous poem by Francis Hopkinson, describes the incident. Mr. Bushnell invented several destructive machines, not all of which were successful. He served during the war of the Revolution, and was made captain of the corps of sappers and miners.

**BUSHNELL**, a city of Illinois, about 50 miles west of Peoria. It is finely situated in a healthy prairie region. It contains various manufactories, and in the vicinity are found excellent coal and timber.

**BUSHRANGERS**, in Australia, originally runaway convicts, who had taken to the "bush" and become robbers. In the early years of the century they established a reign of terror in what was then the sparsely settled Van Diemen's Land. In 1815 martial law was proclaimed in the district by the lieutenant-governor, and under Governor Arthur (1824-36) stern measures were taken to repress crime. In 1830 a severe bushranging act was passed in New South Wales, where at one time a band of 50 desperadoes in the Bathurst district fought regular engagements with the settlers and police, and only surrendered to a detachment of soldiers brought from Sydney. Subsequent outbreaks occurred at intervals, but generally only three or four ruffians would band themselves together, and after a more or less brief and desperate course they were brought to justice. In later years bushranging has been facilitated by the colonial land laws, which permit "free selection before survey," thus allowing people to settle in isolated spots outside the scope of police supervision.

**BUSH-STRIKE**, the name of a South American passerine bird, of the family *Formicariidae* and subfamily *Thamnophilinae*. It resembles the butcher bird or shrike in its habits; and haunts thick trees, bushes and underwood, where it seeks for insects, larvæ, young birds and eggs.

**BUSKIN**, a kind of half-boot laced to the ankle and lower part of the leg. The ancient tragedians wore a similar boot (*cothurni*), often with a thick sole in order to add to the actor's height. Hence the word "buskin" is often used for tragedy as "the sock" (*soccus*, "a flat-soled shoe") is for comedy.

**BUSSEY**, Cyrus, born in Hubbard, Trumbull county, Ohio, Oct. 5, 1833, was the son of a Methodist preacher, and entered the mercantile business. He was elected to the State legislature as a Democrat in 1858, and was a delegate to the convention that nominated Stephen A. Douglas for the Presidency. During the war he served on the Union side. He commanded the militia in southeastern Ohio, raised and was colonel of the 3d Iowa volunteer cavalry; was in the Arkansas campaign of 1862, led the 3d brigade of Steele's division, was chief of cavalry at the siege of Vicksburg, led the advance on Johnston under Sherman, was made brigadier-general in 1864 for "special gallantry," restored discipline at Fort Smith, where he was given command, and in 1865 was brevetted major-general. He has been in business in St. Louis and New Orleans since the war, and in 1881 removed to New York. He was for six years president of the New

Orleans Chamber of Commerce, and was chairman of the committee from that body which secured from Congress the appropriation for Captain Eads's jetties at the Mississippi River's mouth.

**BUSSU PALM** (*Manicaria saccifera*), a palm growing in the tidal swamps of the Amazon. The stem is only from 10 to 20 feet high, but the immense undivided coarsely serrate leaves are often 30 feet in length by 4 or 5 in width. These are used by the Indians for thatch. The spathes, taken off entire, are used as bags, or, when cut longitudinally and prepared, answer the purpose of coarse, strong cloth.

**BUST**, the sculptural representation, in the round, of the head and shoulders of a person. The term may be applied to the head and neck only, or to a representation of the head with the neck, breast, shoulders and upper part of the arms, or to the head, neck, shoulders and breast. A bust is usually set upon a base or pedestal, and may be made of marble, stucco, clay, metal, wood, or wax. It may be portrait or be purely ideal.

**BUSTAMANTE**, ANASTASIO, a Mexican physician, soldier and statesman, born at Jiquilpan, in the province of Michoacan, July 27, 1780, died at San Miguel de Allende, Feb. 6, 1853. He was physician in the family of Don Felix Maria Calleja, military governor at San Luis Potosi. Presented by his employer with a commission in the San Luis militia, he served in many battles, and in those of Aculco, Guanajuato and Calderon gained special distinction. He rose through the successive military grades to the position of general of division, the highest rank in the Mexican army, and became military governor of the interior provinces. In 1829 he headed the revolution, and the following year became vice-president of the republic, exercising the supreme executive power. This position he held until the revolution of 1832 obliged him to resign, and the following year he was banished from Mexico. On the death of Santa Anna he was recalled and elected president of the republic, his term extending from 1837 to 1841. In 1846 he was appointed president of the congress, the last important office held by him.

**BUSTEED**, RICHARD, born in Cavan, Ireland, Feb. 16, 1822. He emigrated with his father to Canada, whence he came to New York city, where he worked on the "Commercial Advertiser," and was a licensed local Methodist preacher. Admitted to the bar in 1846, he made a reputation in extradition cases, and for three years was corporate counsel for New York city. He was a Democrat and a supporter of Douglas, but after the outbreak of the civil war he strongly supported the Union cause. He was made brigadier-general of volunteers, and was assigned to service at Washington and New York. He commanded a brigade at Yorktown in Virginia, but resigned on account of the jealousy of his enemies in the Democratic party. In 1864 he was appointed by the President as United States district judge of Alabama, and while occupying this position rendered the decision that the test-oath prescribed by the United States was unnecessary and unconstitutional as applied to lawyers practicing before the United States courts. This opinion was afterwards confirmed by the Supreme Court. Busted resigned his office in 1874, and returned to his law practice in New York city.

**BUTCHER-BIRD**, the Shrike. See *Britannica*, Vol. XXI, pp. 845-46.

**BUTCHER'S BROOM** (*Ruscus*), a genus of evergreen, usually dioecious, shrubs of the asparagus group of *Liliaceæ*. *Ruscus aculeatus* is the common butcher's broom, so-called because used by butchers to sweep their blocks. It grows more commonly



and luxuriantly in the south of Europe. The fruit is a red, one-seeded, sweetish berry. It grows well under trees or shrubs, and can often be advantageously introduced for ornamental purposes. The root was formerly used as an aperient and diuretic.

BUTLER, BENJAMIN FRANKLIN, an American lawyer, statesman and soldier, was born in Deerfield, N. H., Nov. 5, 1818. He graduated at Waterville College (now Colby University, Me.); began the practice of law in Lowell, Mass., in 1840, and attained a high reputation in criminal cases. He was elected to the Massachusetts legislature (1853 and 1859), serving in the lower and afterward the upper house; was delegated to the Charleston Democratic national convention, and on the re-assembling of some of the delegates at Baltimore he resigned his seat on account of the slavery question. In 1861 (being already a commissioned brigadier-general) he responded to the President's call for troops, and marched his 8th Mass. regiment to Annapolis; moved forward to Baltimore; was made a major-general, and assigned to the command of Fortress Monroe. At this time some slaves escaped into his lines, and he refused to give them up to their masters on the ground that they were "contraband of war." Feb. 23, 1862, he was placed in command of troops forming part of the expedition against New Orleans, Captain Farragut commanding the naval force. Gen. Butler took possession of the city May 1, 1862, and remained there until the middle of December following, when he was relieved by Major-General N. P. Banks. During his administration of the Department of the Gulf he compelled the rich citizens to contribute to the support of those rendered destitute by the war, armed the freed colored men, and enforced strict sanitary regulations. In the latter part of 1863 he was given command of the Department of Virginia and North Carolina. In 1864 he was ordered to New York during election, as trouble was feared. The following month he was sent against Fort Fisher in North Carolina, but the expedition was ineffectual. Gen. Grant relieved him of command, and he returned to Massachusetts. The Republicans elected him to Congress in 1866, and he served there until 1879, with the exception of the term 1875-77. He took part in the impeachment of President Johnson, as one of the managers of the case. In 1882 the Democrats united upon him as candidate for governor of his State, and he was elected to that office. He was defeated in his candidature for the same office in 1883, and was also an unsuccessful Greenback candidate for the Presidency in 1884.

BUTLER, BENJAMIN FRANKLIN, born at Kinderhook Landing, N. Y., Dec. 17, 1795, died in Paris, France, Nov. 8, 1858. He studied law with Martin Van Buren in Hudson, N. Y., and became his partner. In 1821 he was chosen district attorney of Albany county. He was one of three commissioners appointed by the legislature to revise the New York statutes, and in 1828 was elected to the legislature to assist in the deliberations on the work of this committee. He was appointed attorney-general by President Jackson.

BUTLER, ELIZABETH SOUTHERDEN THOMPSON, a noted English artist, born in Switzerland in 1844, and in 1877 married Major-General Butler. She was brought into prominence by her painting, *The Roll Call*, which was exhibited at the Royal Academy in 1873, and which became the property of Queen Victoria. Her works are mostly military subjects.

BUTLER, FANNY KEMBLE. See KEMBLE.

BUTLER, JOHN, born in Connecticut, died in Niagara, 1794. He espoused the British cause at the commencement of the Revolution, and, placed

in command of a force of Indians and Tories, took part in the Niagara and Montreal campaigns, and was present at the battle of Oriskany, the Wyoming massacre, and the raids on the Schohaie and Mohawk settlements. He was guilty of great barbarities, but some of the worst deeds attributed to him were due to his son Walter. Colonel John Butler was rewarded by the British government for his military services by being made Indian agent with a salary of \$3,500 a year and the gift of 5,000 acres of land in Canada.

BUTLER, PIERCE MASON, colonel, born in Edgefield district, S. C., April 11, 1798, killed in the battle of Churubusco, Mexico, Aug. 20, 1847. He received a military education, and after four years' service in the army he resigned and went to Columbia, S. C., where he was president of a bank. In 1836 he went as lieutenant-colonel of a regiment to put down the Seminole Indians; in 1838 he was elected governor of South Carolina, and at the expiration of his term was appointed Indian agent. In 1846 he resigned this office to enter the Mexican war. He served with great bravery, and won distinction at Cerro Gordo. In the battle of Churubusco he led his men after being wounded, but was again shot, and this time instantly killed.

BUTLER, WILLIAM ALLEN, author and lawyer, son of B. F. Butler, of New York, born in Albany, N. Y., Feb. 20, 1825, graduated from New York University, traveled in Europe, practiced law in New York city, and published books, magazine articles and fanciful poems. Among his writings are: *Out-of-the-Way Places in Europe*; *The Colonels' Club*; *The Cities of Art and the Early Artists*; *Barnum's Parnassus*; *Nothing to Wear*, a satirical poem; *Two Millions*; *General Average*; *The Bible by Itself*; *Martin Van Buren*; *Lawyer and Client*; *Mrs. Limber's Raffle*; and *Domesticus*.

BUTLER, MAJOR-GENERAL WILLIAM FRANCIS, K. C. B., born in county Tipperary, Ireland, in 1838. He was educated at Dublin, and joining the army served on the Red River expedition; was sent on a special mission to the Saskatchewan (1870-71); served on the Ashanti expedition (1873), as staff officer in Natal (1879), and took a prominent part under Lord Wolseley in the Soudan campaign (1884-85). He has published *The Great Lone Land* (1872); *Wild North Land* (1873); *Akimfoo* (1875); *Far Out* (1880). In 1877 he married Miss Elizabeth Southerden Thompson, a distinguished painter of battle scenes.

BUTLER, WILLIAM ORLANDO, born in Jessamine county, Ky., in 1791, died in Carrollton, Ky., Aug. 6, 1880. He was a graduate of Transylvania University, studied law, but on the outbreak of the war of 1812 went into military service. He was at Fort Wayne, the two battles (Jan. 18 and 22, 1813) on Raisin River, and at the second was wounded and captured, escaping to his native State only after great hardships. He raised a company of volunteers, which did good service at Pensacola and New Orleans. He was promoted to be major, and soon after succeeded his brother as aid-de-camp to General Jackson. He left the army in 1817, and resumed his law practice. He served three years in the legislature, and was unsuccessful candidate for governor in 1844. He served in the Mexican war, and was wounded at Monterey. In 1848 he succeeded General Scott as chief commander, and held the place till the war closed. He was unsuccessful candidate for the vice-presidency in 1848, when Cass was at the head of the ticket.

BUTLER, a prosperous town of Missouri, county-seat of Bates county. It is pleasantly situated in a fertile prairie, about 75 miles southeast of Kansas City. It is an important shipping point for coal,

which is extensively mined in the vicinity. It contains also manufactories of wool, and is the seat of an academy.

**BUTLER**, a thriving town of Pennsylvania, county-seat of Butler county, situated on the Conoquenessing Creek, about 25 miles north of Pittsburgh. It contains extensive glass manufactories, in which natural gas is used; a number of planing-mills, flouring-mills, and woolen mills, and several establishments for the manufacture of machinery for the numerous oil-wells in the vicinity.

**BUTLERAGE**, otherwise called the *prise* of wines, was a right exercised by the crown in England to take two tons of wine from every ship (English or foreign) importing into England twenty tons or more, which, by charter of Edward I, was exchanged into a duty of two shillings for every ton imported by merchant strangers, and called butlerage, because paid to the king's butler.

**BUTOMUS**, a genus of *Helobia*, an order of aquatic monocotyledons, sometimes called marsh-lilies, of which one species, *Butomus umbellatus*, is frequent in ditches and ponds in England, Ireland and many parts of Europe, but rare in Scotland. It is considered one of the most beautiful plants in the British flora. The leaves are all radical, 2 to 3 feet long, linear and triangular. The flowering stem bears a large umbel of rose-colored flowers.

**BUTT, ISAAC**, Irish patriot, born in County Donegal in 1813, died May 5, 1879. He was educated at Raphoe and at Trinity College, Dublin, where he gained a brilliant reputation for accomplished scholarship. He edited the "Dublin University Magazine" from 1834 to 1838, and filled the chair of Political Economy in his University from 1836 to 1841. Called to the Irish bar in 1838, he soon became a champion of the Conservative cause, actively opposing O'Connell's Repeal Association in 1843. His political conversion occurred early, for in 1852 he was returned as a "Liberal Conservative" for Youghal, for which constituency he sat until 1865. He defended Smith O'Brien and others in the state trials of 1848, and all the Fenian prisoners between the years 1865 and 1869. Butt was the first to make political use of the phrase "home rule," and in 1871 he was returned for the city of Limerick to take the lead of the Home-Rule party in the House of Commons, but was unable to control the forces he had formed.

**BUTTE CITY**, a city of Montana, capital of Silver Bow county, located 65 miles south of Helena. It derived its name from its proximity to a lofty mountain peak, called Big Butte, half a mile west of the present city limits. It is preëminently a mining town, the output of gold, silver and copper during 1890 exceeding \$25,000,000. The principal part of the city is regularly laid out, the streets crossing at right angles. The principal public buildings are the court-house, opera-house, high school, St. James's Hospital, and St. James's parochial school. The city is well supplied with water, has two electric light companies, a gas company, good sewerage, and three lines of street railways, one using a cable and another electricity as its motive power. There are daily and semi-weekly newspapers, and both National and State banks. The growth of the city is very rapid, the amount expended for the erection of business houses in 1890 being \$943,500, and for residences double this amount. The population has increased from 3,363 in 1880 to 10,701 in 1890.

**BUTTER**, in old chemistry, applied to certain metallic substances which have an oily aspect and consistence resembling melted butter; such as butter of antimony, bismuth, zinc and tin. It is often applied generically to any substance of the consist-

ence of butter, and is therefore used to designate palm, cocoa-nut, shea, and nutmeg oils, called "vegetable butters."

**BUTTER ROCK**, or *HALOTRICHITE*, a mineral which may be regarded as a variety of alum—an iron alum, appearing as a pasty exudation from rocks that contain alum or its constituents, particularly alum-slate and other schistose rocks. Rock butter occurs at Hurler alum-works near Paisley, Scotland, and in a number of places on the continent of Europe. It is not unlike butter in color, is silky-fibrous, and has an astringent taste.

**BUTTER-BUR** (*Petasites vulgaris*), a perennial composite, common in wet meadows and beside streams. The small sub-dioecious whitish-purple flower-heads are born in exuberant racemose masses, which come up like those of its ally, colts-foot (*Tussilago*), in early spring, before the leaves.

**BUTTERCUP**, a name given to one or more of the common species of *Ranunculus*, having bright yellow cup-shaped flowers. See Britannica, Vol. XX, p. 272.

**BUTTERFIELD, DANIEL**, born in Utica, N. Y., Oct. 31, 1831, graduated at Union College, and then became a merchant in New York city. When the civil war began, as colonel of the 12th New York regiment he accompanied it to Washington (July, 1861), and led the advance into Virginia, joining General Patterson on the Upper Potomac. He fought in the divisions of Fitz-John Porter, Pope, and McClelland, and was in the battles of Hanover Court House, Mechanicsville, Gaines's Mills, Fredericksburg, Chancellorsville, Gettysburg, where he was wounded, Mission Ridge, Buzzard's Roost, Dallas, New Hope Church, Kenesaw and Lost Mountains, and others. His rank was frequently raised, and he was brevetted brigadier and major-general for meritorious conduct. After the war he was superintendent of the general recruiting service in New York city, and commanded the New York harbor forces from 1865 to 1869. Resigning from the army, he was placed at the head of the United States sub-treasury in that city. He has since been connected with the American Express Company, which his father organized.

**BUTTERFIELD, JOHN**, born in Helderberg, N. Y., in 1783, died in Utica, Nov. 15, 1869. He was a self-educated man, who in his youth was the driver of a stage-coach. He removed to Utica in 1822, and did much for the prosperity of that city. He assisted in the management of the Albany and Buffalo stage line, owned many stage routes in Western New York, was part owner of a line of steamers on the St. Lawrence River and Lake Ontario, founded the Butterfield, Wesson & Co. Express Company, and was the originator of the American Express Company, in which a number of firms were consolidated. He also built the Morse telegraph connecting New York and Buffalo, and was president (1858) of the Overland Mail Company, which was employed by the Government to carry the mail between San Francisco and the Missouri River once a month, and afterwards once a day.

**BUTTERFLIES**. See Britannica, Vol. IV, pp. 592-98.

**BUTTERFLY-WEED**, or *PLEURISY ROOT* (*Asclepias tuberosa*), a North American plant, of which the root has considerable medicinal repute, the infusion being used as a diaphoretic and expectorant.

**BUTTERNUT**, an American tree (*Juglans cinerea*) of the walnut family; also the fruit so-called from the oil it contains. The nut is long, pointed, and furrowed. The wood is used in cabinet-work.

**BUTTER-TREE** (*Bassia*), a genus of tropical or sub-tropical trees of the natural order *Sapotaceæ*,



remarkable for the abundance of oil or butyraceous fat which the seeds contain, and which is used for many purposes by the inhabitants of the countries where they are indigenous. The butter-tree described by Mungo Park as growing in the interior of Africa, in the country of Bambarra, belongs to this or a nearly allied genus. It produces the galam butter also called shea butter, which is highly valued, and forms an important article of commerce in the interior of Africa. The Mahwa-tree of India, *Bassia latifolia*, attains a height of 40 to 60 feet, and is a valuable timber tree. Its flowers are eaten raw, and have a luscious taste when fresh; when dry, they resemble figs in flavor. One tree sometimes produces as much as 800 pounds of flowers. The Indian butter-tree, or Fulwa tree, *Bassia butyacea*, a native of Nepaul, attains a height of 50 feet. Its timber is light and of no value. The fruit is of the size of a pigeon's egg, and, although eaten, is not much esteemed; but from the seed a concrete oil or butter is obtained, much valued for medicinal uses. *Bassia longifolia*, a native of Coromandel, yields a large quantity of oil; the flowers are much esteemed for eating, and the wood is almost as hard and durable as teak. The name butter-tree is also given to other tropical trees, belonging to quite different orders, the fruits of which yield fixed oils.

BUTTERWORT, a name common to the several species of *Pinguicula*, small plants with a characteristic bunch of apparently stemless leaves, growing in wet ground. The common butterwort, *Pinguicula vulgaris*, is abundant in the northern parts of Britain and Europe, and grows also in Canada. Its leaves are covered with stalked glands, which yield a viscous, insect-catching secretion. The edges of the leaf roll over on the insect and retain it, and it is supposed that insects so caught serve as food for the plant. This secretion contains acid and pepsin, and has active digestive properties. Hence it has the power of coagulating milk, and is used for this purpose by the Laplanders. Some species possess flowers of much beauty, especially *Pinguicula grandiflora*. North and South America have several species of butterwort. See *Britannica*, Vol. XIII, pp. 134-37.

BUTTERWORTH, HEZEKIAH, author and editor, born in Warren, R. I., Dec. 22, 1839. As an author he is best known for his juvenile stories of travel. In the series of "Zig-Zag Journeys," descriptions are given of his tours in many lands. Among his other writings are: *Stories of the Hymns; The Prayers of History; Poems for Christmas, Easter, and New Year; Great Composers*, written for the Chautauqua course of reading; *Wonderful Christmases of Old*; and the three cantatas, *Under the Palms, Faith, and Faith Triumphant*. In 1871 he became assistant editor of the "Youth's Companion."

BUTTS, ISAAC, journalist, born in Washington, Dutchess county, N. Y., Jan. 11, 1816, died in Rochester, N. Y., Nov. 20, 1874. He was educated at the common school and at Rochester high school, engaged in various pursuits, and in 1845 assumed editorship of the Rochester "Advertiser," the oldest daily newspaper in the United States west of Albany. The paper was Democratic in politics, and as the question came up in Congress at this time whether slavery should be allowed in the territory newly acquired from Mexico, Mr. Butts took the ground that the people of the territory should settle the matter themselves. "Popular Sovereignty" or "Squatter Sovereignty" was the principle, and the phrase originated in Mr. Butts's paper (Feb. 8, 1847), although Daniel S. Dickinson, Lewis Cass, and Stephen A. Douglas respectively claimed the honor. Mr. Butts sold the "Advertiser" in 1848, and for four years was engaged in the enterprise of house

printing telegraph and in the construction of lines which converged at St. Louis. In the latter part of 1852 he purchased an interest in the Rochester "Union." Five years later the "Advertiser" was incorporated with it, and Mr. Butts continued as editor till 1864, when he permanently retired. He was an organizer and for years one of the managers of the Western Union Telegraph Company. His volume on *Protection and Free Trade*, with a memoir, was published after his death.

BUTYRIC ACID, volatile fatty acid, first prepared by Chevreul, by treating butter with an alkali. It has a strong rancid smell and acrid taste. Butyric acid may be prepared from butter, or by fermenting sugar with putrid cheese. It occurs also in the juice of meat in various fats, and in perspiration. It is readily soluble in water and alcohol, and forms a whole series of salts.

BUTYRIC ETHER, or ARTIFICIAL PINE-APPLE OIL, a fragrant oil obtained by distilling butyric acid, alcohol, and sulphuric acid. The material which passes over is the butyric ether, which is usually prepared for commerce by being mixed with alcohol. It possesses the flavor of pine-apples, and is extensively used for flavoring confections, for sophisticating bad rum, and for flavoring ices, creams, etc.

BUXBAUMIA, a small genus of mosses.

BUYS-BALLOT, CHRISTOPH, meteorologist, born at Kloetingen in Zealand, Oct. 10, 1817. He studied at Utrecht, where he subsequently became professor of Mathematics (1847) and of Experimental Physics (1870), and in 1854 director of the Royal Meteorological Institute. He was one of the initiators of the new system under which, by daily synoptical weather reports, and by simultaneous observations by land and by sea, materials are collected for forecasting changes; his own observations have resulted in the determination of a general law of storms, known as the Buys-Ballot law (see *Britannica*, Vol. III, p. 29). The inventor of the *Aéro-klinoscope*, and of a system of weather signals, he has been largely instrumental in bringing about an international uniformity in meteorological observations. His works include *Changements Périodiques de la Temperature* (Utrecht, 1847), and in English *Suggestions on a Uniform System of Meteorological Observations* (1872-73).

BUYUKDEREH, a village beautifully situated on the Bosphorus, 10 miles northeast of Constantinople. It forms the summer residence of many of the ambassadors of the Christian powers, some of whom have splendid mansions here.

BUZZARD. See *Britannica*, Vol. IV, p. 603. For the so-called "turkey-buzzard" of the United States, see under *AMERICAN VULTURE*, *Britannica*, Vol. XXIV, p. 302.

BYBLOS, an ancient city of Phœnicia, at present a village of 600 inhabitants, called Jebel. It is situated on a shallow bay at the base of the lower range of the Libanus, about half-way between Tripoli and Beyrout. Byblos was famous as the birthplace of Adonis or Tammuz, of whose worship it became the center, and many devotees were also attracted to the splendid temple of Astarte erected here. The name given to the town by the Jews was Gebal, and its inhabitants are noticed in the Scriptures as stone-squarers and calkers of ships. A ruined wall belonging apparently to the era of the Crusades surrounds the town, and Roman and earlier remains are still visible.

BY-LAWS, the private regulations which are made by a legislative body, a corporation, or a society for its government. They differ from provisions of its constitution in that they are more particular and more readily altered. By-laws are bind-

ing unless contrary to the laws of the land, or to the charter or act of incorporation, or unless they are manifestly unreasonable.

BYRD, WILLIAM, F. R. S., born in Westover, Va., March 16, 1674, died there Aug. 24, 1744. He was educated in England, and there studied law, but returned to reside on his American estates, and long held important offices in Virginia. He collected a valuable library, was the founder of Richmond and Petersburg, and was one of the commissioners appointed to settle the boundary line between Virginia and North Carolina. He was author of valuable papers relative to the boundary line settlement and his travels in Virginia. A part of his writings were published as *The Westover Manuscripts* (1841).

BYRGIUS, JUSTUS, or JOST BURGI, the inventor of various astronomical instruments, born at Lichtensteig, in the Swiss canton of St. Gall in 1552, died in 1633. In 1579 he entered the service of the learned Landgrave of Hesse, Wilhelm IV, and in 1604 that of the Emperor Rudolf II. His first work was a celestial globe, in which the stars were placed according to his own observations.

BYRLAW (also BIRLAW or BURLAW), a sort of popular jurisprudence formerly in use in Scotland. Sir John Skene, writing in 1597, when the system was in full force, defines byrlaw as "*leges rusticorum de re rustica late*—laws made by husbandmen, concerning neighborhood to be kept among themselves." As the byrlaw was enacted by the common consent of the villagers or neighbors, so it was administered by judges chosen by them from their own ranks. These judges were commonly called "byrlaw men." Byrlaw seems to be an interesting survival of the system of the ancient Aryan village community, or at least an illustration of the principle of visnet, voisinage, or neighborhood, on which many early institutions were founded.

BYRNE, ANDREW, Roman Catholic bishop, born in Navan, Ireland, in 1802, died at Little Rock, Ark., 1862. He was educated at the college of his native town, and came to America in 1820 with Bishop England, who visited Ireland for the purpose of securing Catholic missionaries for the work in America. Having completed his studies under the prelate's direction, Byrne was ordained in 1827, and assigned to duty in North and South Carolina. In 1836 he was appointed to pastoral work

in New York city, and in 1844 was made first bishop of the diocese of Little Rock. He made three visits to Ireland, on the last two of which he secured the services of priests and sisters of mercy to assist in his work. Through his efforts the Catholic schools and churches increased in numbers and prosperity, and immigration was greatly promoted.

BYRON, HENRY JAMES, dramatist, born in Manchester, England, in 1834, died in London, April 11 1884. He entered the Middle Temple in 1858 and was for many years a prolific and popular writer of burlesque and extravaganzas. He also wrote extensively for periodicals, was the first editor of "Fun," and occasionally himself appeared in the presentation of his plays. Of his plays the best was *Cyril's Success* (1868), and the most successful, *Our Boys*, which had an unprecedented run in London from Jan. 16, 1875, to April 18, 1879.

BYSSUS, a genus of plants established by Linnaeus to include some of the lowest and most obscure forms of vegetation, and defined as having a substance like fine down or velvet. Botanists have sometimes ranked it among *Algae*, sometimes among *Fungi*, and others have rejected the genus as altogether spurious. It is still retained by some systematists, but as a mere provisional limbo to include a number of forms of moulds which appear in damp places and disappear without showing any signs by which their true nature and affinities may be determined. The progress of research has greatly reduced this vague alliance, some forms having been recognized as algal, others as fungal in nature; and its disappearance from our lists may be regarded as a mere question of time.

BYSSUS, in conchology, a name for silk-like threads secreted by the "foot" or muscular ventral protrusion of many bivalve mollusks. The secretion, manufactured by a gland opening in a median posterior furrow, is at first fluid, but soon hardens into a tuft of silky, spreading threads, which serve to anchor the mollusk temporarily or permanently to its base of attachment. It is developed by species of the families *Mytilidæ*, *Pinnidæ*, *Aviculidæ*, *Limidæ*, *Arcidæ*, etc. That of the *Pinna* is capable of being woven, and in early times was made into small articles of dress for royal personages.

BYTTNERIACEÆ, a natural order of plants, of which the typical genus is *Byttneria*. The species are chiefly tropical or subtropical.



## C

## CAAIING WHALE—CABLE

**CAAIING WHALE** (*Globicephalus melas*), one of the Cetacea, in the dolphin family, belonging to a genus common in all seas, and oftener stranded than any other "whale." The length varies from 16 to 24 feet; the maximum girth is about 10 feet. It feeds chiefly on cuttle-fish. The caaiing whale is gregarious, and vast shoals of 50 to 100 sometimes impetuously follow their leader ashore, when alarmed. Many names are given to these common cetaceans; among the most popular are *pilot-whale*, *black-fish*, *social whale*, and *grindhoal*. See *Britannica*, Vol. XXIV, p. 525.

**CAAMÑO**, José M. PLÁCIDO, born in Guayaquil, Ecuador, Oct. 5, 1838. He studied law and theology in his native city and at Quito. He was mayor of Guayaquil, was leader of a successful revolutionary expedition, became president *ad interim*, and then president of the government in 1884. He has advanced the prosperity of Ecuador by encouraging the building of railroads, telegraphs, colleges and schools.

**CAB**, a carriage with either two or four wheels, and drawn by one horse. The name is derived from the *cabriolet-de-place*, introduced into England from France at the beginning of the present century (see *Britannica*, Vol. V, p. 136). In Paris the *cabriolet-de-place* was introduced about the middle of the 17th century by Nicholas Sauvage, whose residence in the Rue St. Martin at the Hotel St. Fiacre has given the name of fiacres to the public carriages of that city. The cabs of foreign countries and of our own chief towns have their peculiar features, and are governed by police or municipal regulations.

**CABANEL**, ALEXANDRE, a noted French historical and portrait painter, born at Montpellier in 1823. Among his principal works are *The Lost Paradise*, *John the Baptist*, *Venus*, and *Lucretia and Tarquin*.

**CABAL**, a term now employed to denote a small, intriguing, factious party, united for political or personal ends. It had been previously used to denote a secret committee or cabinet when, during 1667-73, it was especially applied to Charles II's infamous ministry (see *Britannica*, Vol. I, p. 121). The derivation goes back to the Hebrew *Kabalah*.

**CABBAGE BUTTERFLY**, a name applied to several species of butterfly, the larvæ of which devour the leaves of plants of the cabbage tribe. The female lays her eggs, which are conical and of a bright yellow color, in clusters of 20 or 30 on the under sides of the leaves of plants which are the destined food of the caterpillars. When fully grown these are about one inch and a half long, and excessively voracious. They suspend themselves by their tails, and are transformed into shining pale-green chrysalids, spotted with black, from which the perfect insect emerges, either the same season or after the lapse of a winter, no longer to devour cabbage leaves, but to subsist delicately upon honey.

**CABBAGE-FLY**, a fly of the same family as the house-fly, whose larvæ often do great injury to the roots of cabbages and similar plants. Watering with lime-water will kill the maggots, which are on the lower stems.

**CABBAGE-MOTH**, a species of moth, whose caterpillar feeds on cabbage and turnip leaves. The caterpillar is greenish-black, and changes to a brown pupa in autumn. The perfect insect is of a rich mottled-brown color, the upper wings clouded and waved with darker brown, and having pale and white spots, a yellowish line near the fringe, the fringe dotted with black and ochre, the under wings brown and white.

**CABBAGE-PALM**, or **CABBAGE-TREE**, a name given to a species of palm, whose great terminal bud is eaten like cabbage. The *Areca oleracea* is the cabbage-palm of the West Indies. The *Sabal palmetto*, otherwise called the palmetto, is the cabbage-palm of the Southern States. See *PALM*, Vol. XVIII, p. 189.

**CABER**, **TOSSEING THE**, a Scottish athletic exercise or feat, in which a long peeled sapling or undressed stem of a young tree, heavier at one end than the other, is held perpendicularly balanced against the chest, small end downward, and tossed so as to fall on the heavy end and turn over, the farthest toss and straightest fall winning. The thin end, held in the hand, should be not more than three inches in diameter; the average length of a good larch caber is about 21 feet.

**CABES**, or **KHABS**, **GULF OF**, an inlet of the Mediterranean Sea, lying between the islands of Kerkenna and Jerba, on the northeast coast of Africa, in latitude 34° north, and longitude from 10° to 11° east. The town of Cabes stands at the head of the gulf.

**CABEZON DE LA SAL**, a town of Spain, in the province of Valladolid. It is situated on the Pisuerga, and is celebrated as the scene of one of the first battles of the Peninsular campaign, in which the Spaniards were defeated by the French. Population, 2,000.

**CABINDA**, a small Portuguese territory on the west coast of Africa, delimited in 1886, bounded on the east by the Congo State, which on the south separates it from the mouth of the Congo. The capital, Cabinda, was formerly a noted slave port. See *Britannica*, Vol. IV, p. 618.

**CABINET**, a small chamber set apart for some special purpose, such as the conservation of works of art, antiquities, specimens of natural objects, models, etc. It often means simply a small room appended to one larger. From signifying the chamber in which such collections are contained, the term has more recently come to be applied to the collections themselves. Cabinet also signifies an ornamental piece of furniture having shelves or drawers, or both, or simply cupboards closed with doors.

**CABLE**, **GEORGE WASHINGTON**, author, born in New Orleans, La., Oct. 12, 1844. Obligated by the death of his father, in 1859, to leave school, he became a clerk, and in 1863 enlisted in the Confederate army, fought gallantly, was wounded, and, at the end of the war finding himself destitute, became an errand-boy. He studied civil engineering, and was for a time attached to a surveying expedition. During a period of ill-health he began writing poems and humorous sketches for the New Orleans "Picayune," and soon after was regularly attached to the editorial staff. On severing his

connection with this paper, he became a contributor to "Scribner's Monthly." His stories deal with Creole life as found in the city of his birth. His published books are: *Old Creole Days*, *The Grandisimus*, *Dr. Sevier*, *Madame Delphine*, *The Creoles of Louisiana*, *The Silent South*. This author has introduced a new field to the attention of readers. His stories are gracefully told, the characters are delicately drawn, and a sunny humor traces its way through them all. He is a popular lecturer, and gives most enjoyable readings from his own works. He is greatly interested in Sunday-school work, and is a favorite writer and lecturer on the International Lessons.

**CABLING**, the moulding by which the hollow parts in the flutes of columns and pilasters in classical architecture are often partially filled. The cabling seldom extends beyond the third part of the shaft from the ground.

**CABOCHÉ**, or **CABOSSÉ**, a term in heraldry, from the old French word *caboche*, the head. When the head of an animal is borne, without any part of the neck, and exhibited full in the face, it is said to be caboched.

**CABOOSE**, or **CAMBOOSE**, the name of a kitchen or cook-room in a merchant-ship. In coasting-vessels the term is applied to a portable cast-iron stove on the deck, where food is cooked. In the United States a car for the use of the conductor, brakemen, etc., on a freight train.

**CABOT**, GEORGE, statesman, born in Salem, Mass., Dec. 3, 1751, died in Boston, April 18, 1823. At the age of 25 he was a member of the Massachusetts Provincial Congress, and in 1790 was elected to the United States Senate. He was an assistant of Alexander Hamilton in his financial schemes, and an authority on political economy.

**CABRERA**, DON RAMON, Carlist leader, born at Tortosa, Catalonia, in 1810, died at Wentworth, near Staines, May 24, 1877. He was intended for the church, and had already received the minor orders when the civil war broke out at the death of Ferdinand in 1833. He at once joined the partisans of Don Carlos, and by his energy and pitiless cruelty made his name a household word throughout Aragon and Valencia. Defeated and wounded at Ranoon, he escaped with difficulty, but soon reappeared at the head of a formidable force, defeated the royal army in two engagements, and for a time threatened Madrid itself. In 1839 Don Carlos created him Count of Morella, and governor-general of Aragon, Valencia and Murcia. He strongly opposed Don Carlos's abdication in 1845, and in 1848 renewed the struggle for absolutism in Spain; but the attempt proved an utter failure, and he was obliged to take refuge in France.

**CACAO BUTTER**, a fixed oil expressed from the fruit of *Theobroma cacao*, and largely used in pharmacy and in the preparation of cosmetics.

**CACCAMO**, a town in the province of Palermo, Sicily, about six miles southwest of Termini. Population, 6,394.

**CÁCERES**, ANDRÉS AVELINO, Peruvian soldier, born in Huanta, April 12, 1831. He joined the army as second-lieutenant in 1852. He assisted in the abolition of slavery under Castilla; won the rank of colonel, distinguished himself in the war with Chili, was made brigadier-general, and was instrumental in the overthrow of the Peruvian General Iglesias, who had established a government of his own at Cajamarca. Cáceres entered the capital in March, 1885, was elected president in December, and inaugurated in July, 1886.

**CACERES**, NUÉVA, a town of the Philippines in the province of South Camarines, on the island of Luzon. It is situated on the river Naga, or Santa

Cruz, between the Bay of San Miguel and the Gulf of Rogay, about 175 miles southeast of Manila. Population, 12,500.

**CACHE**, a name given by travelers in Canada and the western part of the United States to places for concealing provisions and other articles for present convenience or future use. Usually the place of concealment is in the ground or under a cairn.

**CACHEXIA**, a name applied by physicians sometimes to a group of diseases, and sometimes to the constitutional state accompanying a particular disease, as the cancerous cachexia, gouty cachexia, etc. Cachexia has come to be chiefly employed with reference to diseases in which the general nutrition of the body is at fault, and in which the local disorders are supposed to be the result of a constitutional cause.

**CACHOLONG**, a mineral, regarded as a variety of opal, and sometimes called pearl-opal, or mother-of-pearl opal. It is generally of a milk-white color, rarely with a yellowish or reddish tinge, opaque and dull, or pearly and shining, and has a flat, conchoidal fracture. It is often found united with common chalcedony.

**CACIQUE**, or **CAZIQUE**, the designation given to the chiefs of Indian tribes in the central and southern parts of America. The title was first applied by Spanish discoverers to the native princes whom they found reigning in Mexico, Peru, Hayti and Cuba.

**CACOUNA**, a village of Quebec, beautifully situated on the right bank of the St. Lawrence, about 130 miles below the city of Quebec. It is a favorite summer resort for fishing and hunting and for salt-water bathing.

**CADAMBA**, or **KUDUMBA**, the wood of several species of *Nauclea*, an Indian genus of *Cinchonaceæ*. The wood is deep yellow in color, and is used for furniture, flooring, etc.

**CADASTRAL MAPS**, maps on a large and complete scale, having reference to the extent, value and ownership of landed property, and used for the purpose of apportioning taxes.

**CADE**, JACK, leader of the insurrection of 1450, was by birth an Irishman. For a violation of law he was obliged to flee to France, and served for a time against England, but subsequently returned and settled in Kent as a physician. In June, 1450, assuming the name of Mortimer, and the title of Captain of Kent, he placed himself at the head of about 16,000 followers and marched on London, encamping on Blackheath, from which place he sent a paper to the king demanding redress of certain grievances, and change of counselors. This demand was met by an army, before which Cade retreated to Sevenoaks; there he defeated a detachment, and killed its two leaders. He entered London on July 24, and for two days maintained strict order, though he forced the Lord Mayor to pass judgment on Lord Say, one of the king's detested favorites, and he was promptly executed by Cade's men. On the third day some houses were plundered, and that night the citizens held London Bridge against the insurgents. Dissensions arose among Cade's men; they dispersed, and a price was set upon his head. He attempted to escape, but was overtaken and killed on July 12, near Heathfield, Sussex.

**CADELLE**, a name given in France to the larva of a beetle of the family *Trogositidæ*. It commits great ravages in granaries, and is often imported with grain into countries where it is not indigenous. When full grown it is about three-quarters of an inch long, flattened, fleshy, rough with scattered hairs, whitish, and has a black horny head, furnished with two curved jaws.



**CADENCE**, the finish of a phrase of which there are three principal species, namely: the whole, the half, and the interrupted cadence. The whole cadence, which finishes on the harmony of the tonic, is always used at the end of a composition, and is frequently called the final cadence. In its most perfect use it consists of three chords, the one before the final being always dominant. The half cadence is used to mark the termination of an idea or phrase, like the colon and semicolon, showing a considerable division, but at the same time that a continuation is necessary. The harmony of the half cadence is the reverse of the whole cadence, as it falls from the tonic to the dominant. In the interrupted cadence another harmony quite strange is introduced, so that the ear is deceived. The more particular the preparation for the usual cadence is made, the more strange and unexpected is the interruption, which can be made in so many ways that Reicha, in his *Traité de Haute Composition Musicale*, gives 129 interrupted cadences.

**CADENZA**, in music, an ornamental succession of notes introduced by the performer at the finishing of a phrase.

**CADER IDRIS** ("Chair of Idris," a reputed giant), a picturesque mountain in Merionethshire, Wales, five miles southwest of Dolgelly. It consists of an immense ridge of broken precipices, 10 miles long and one to three miles broad, the highest peak reaching an elevation of 2,914 feet. It is composed of basalt, porphyry and other trap rocks, with beds of slag and pumice. The view from the summit is very extensive, including the Wrekin in Shropshire, and St. George's Channel almost to the Irish coast.

**CADET, MILITARY**. Cadet is a term applied in a general sense to the younger son of a noble house as distinguished from the elder. The military use of the word arose from the practice of providing for younger sons, or cadets, by making them officers of the army. In the United States a military cadet is one who is receiving instruction and military discipline at the West Point Military Academy or at the Naval Academy at Annapolis. Cadets are nominated for admission, after examination, by the President or a member of Congress. Of British military cadets, those destined for the Royal Artillery or Royal Engineers study at the Royal Military Academy at Woolwich, and those for other branches of the service at the Royal Military Academy at Sandhurst.

**CADI**, an Arabic word signifying a judge or person learned in the law. The title of an inferior judge among the Mohammedan nations, who, like the mollah, or superior judge, must be chosen from the higher ranks of the priesthood, as all law is founded upon the Koran.

**CADILLAC**, ANTOINE DE LA MOTHE, born in Gascony, France, about 1660, died about 1717. He was a descendant of a noble family, and was ordered by Louis XIV to examine the coast defenses of the French territory in America. He founded Detroit, Mich., in 1701 (calling it Fort Pontchartrain), established trading forts, discovered a silver mine, which was named "La Mothe," and in 1711 became governor of Louisiana. A fine hotel in Detroit has been named in honor of this Frenchman.

**CADILLAC**, a city of Michigan, county-seat of Wexford county, situated on Clam River, about 100 miles north of Grand Rapids. It is the seat of an extensive trade in lumber, and contains numerous lumber mills, machine shops and foundries, and manufactories of bricks, cigars, carriages and wagons.

**CADIZ**, a town of Ohio, county-seat of Harrison county, pleasantly situated in a fertile, hilly dis-

trict, about 20 miles northwest of Wheeling. It is the center of an important wool-growing industry. In the vicinity are valuable mines of bituminous coal.

**CADMIA**, the term applied to the crust formed in zinc furnaces, and which contains from 10 to 20 per cent. of cadmium.

**CADWALADER**, GEORGE, soldier, born in Philadelphia, Pa., in 1804, died there Feb. 3, 1879. He practiced law; served in the Mexican war as brigadier-general of volunteers; rose to be major-general on account of gallantry at Chapultepec, served as major-general of volunteers in 1862, and was a member of a commission appointed to revise the United States military laws and regulations.

**CADWALADER**, JOHN, an American general, born in Phila., Pa., Jan. 17, 1742, died in Shrewsbury, Pa., Feb. 11, 1786. He was interested in public affairs prior to the Revolutionary war; was captain of a military company, and when the city battalions were formed was placed in command of one of them. Promoted brigadier-general, he was placed in command of the Pennsylvania militia, assisted in the capture of the Hessians at Trenton, and was present at the battles of Brandywine, Germantown and Monmouth. After the close of the war he removed to Maryland, and was elected to the State legislature.

**CADY**, ALBERMARLE, American officer, born in New Hampshire about 1809, and graduated from West Point in 1829. He served chiefly at frontier posts until 1846, fought in the Mexican war from 1846 to 1848, and during the early part of the civil war was on Pacific coast duty. In 1864 he was appointed to the command of the drafting rendezvous in New Haven, Conn., was brevetted brigadier-general, and was soon after retired from service.

**CÆCILIA**, a genus of serpent-like amphibians (see *Britannica*, Vol. I, p. 751), the typical genus of the family *Cæciliidæ*, in which the body is without tail or limbs, with transversely furrowed skin, and usually with small hidden scales. They inhabit warm countries and damp places, burrow like earthworms, and eat worms and insects. About 30 species are known, and are very widely distributed. *Cæcilia* itself is a South American genus, about 20 inches in length, and the thickness of a large worm.

**CAEN STONE**, a fine oölite stone, for which the neighborhood of Caen, in Normandy, France, has long been celebrated. The quarries are subterranean, and the stone is brought up in blocks eight or nine feet long and two thick, through vertical shafts.

**CÆSALPINIA**, a genus of trees of the natural order *Leguminosæ*, the type of the sub-order *Cæsalpinieæ*. This sub-order contains about 1,500 known species, among which many are notable for their purgative properties, as senna; some produce eatable fruits, as the tamarind; some yield resinous and balsamic products, some produce important dye-woods, and some are trees of great size and very valuable for their timber. They are natives of the warm parts of Asia and America.

**CÆSAR**, the title of the Roman emperors, and of the heirs to the throne, was originally the name of a patrician family of the *Julia Gens*, one of the oldest in the Roman state, claiming to be descended from Iulus, the son of Æneas. Octavian bore the name as the adopted son of the great Julius Cæsar, and handed it down to his own adopted son, Tiberius, after whom it was borne by Caligula, Claudius, and Nero. Although the Cæsarian family proper became extinct with Nero, the word Cæsar was part of the style of the succeeding em-

perors, usually between emperor and the personal name, as "Imperator *Cæsar* Vespasianus Augustus." When the Emperor Hadrian adopted *Ælius Verus* (136), the latter was permitted to take the title of *Cæsar*; and from this time in the western, and afterwards also in the eastern empire, it was borne by the heir-apparent to the throne, while Augustus continued to be the exclusive name of the reigning emperor. The name reappears in the *Czar* (or *Tsar*) of Russia, in the *Kaisar* of the "Holy Roman Empire," and the modern empire of Germany, and the *Kaisar-i-Hind* or empress of Hindustan.

**CÆSAREAN OPERATION**, in midwifery, the operation by which the fœtus is removed from the uterus by an incision through the walls of the abdomen and uterus, when delivery is impossible by the natural channel. The risk to the child's life, if it be alive when the operation is begun, is slight; but to the mother's very great. Practitioners are not quite agreed as to the circumstances which justify the performance of such a severe operation on the living female, but all are unanimous as to the propriety of at once removing by it the child of a recently dead woman. The operation has been less often and less successfully resorted to in Great Britain than on the continent of Europe and in America. The *Cæsarean* operation was so called from the report that Julius *Cæsar* was brought into the world in this way.

**CÆSURA**, or **CESURA**, in prosody, a pause or break occurring in the middle of a foot—a sense pause—on the variations in the position of which much of the effect of the rhythm of verse depends.

**CAFFEINE**, or **THEINE**, the alkaloid or active principle of coffee and tea. When isolated it forms beautiful white crystals, with a silky luster, which are soluble in water, alcohol, and ether. It is present in coffee to the extent of about one per cent., and in ordinary tea, from two and a half to six per cent., and is also found in Paraguay and Guiana teas.

**CAGAYAN SULU**, an island of the Asiatic archipelago, lying in latitude 6° 58' north, and longitude 118° 28' east. It is about 20 miles in circumference, well wooded and elevated.

**CAGSANA**, a town near the southern extremity of the island of Luzon, Philippines, with a population of 12,755.

**CAHAWBA**, a navigable river of Alabama. It rises in the northern central part of the State, flows southward about 200 miles, and enters the Alabama at the old village of Cahawba, 10 miles below Selma.

**CAHIR**, a town in the county of Tipperary, Ireland, on the Suir, beautifully situated on the east end of the valley between the Galtees and Knockmealdown Mountains. Cahir Castle, an ancient irregular Norman structure of considerable extent, is situated on a rock on the left bank of the Suir. It has extensive flour mills. Population, 3,000.

**CAHOKIA**, so named from an extinct tribe of Indians, is a quaint village of Illinois, situated on the Mississippi, near East St. Louis. It was settled by the French about 1682; and its present inhabitants, descendants of the original settlers, preserve many of the customs and traditions of their ancestors. In the neighborhood are found numerous remarkable prehistoric mounds.

**CAICOS**, **CAYOS**, or **KEYS**, a group of islands belonging geographically to the Bahamas, but annexed in 1874 to Jamaica. Together with Turk's Islands they have an area of 223 square miles. Population in 1881, 4,778. See *Britannica*, Vol. III, p. 236; Vol. XIII, p. 549.

**CAILLIAND**, **FREDERIC** (1787-1869), a French traveler, born at Nantes, June 9, 1787, died there May 1, 1869. He became a goldsmith and traveled over Europe, and in 1815 went to Alexandria. In examining the mineral resources of Egypt he rediscovered the ancient emerald mines of Jebel Zohara, near the Red Sea; and his report of a journey to Siwah led to its annexation by Egypt in 1820. In 1821-22 he accompanied Ibrahim Pasha's expedition to the White Nile, and his *Voyage à Méroé* (four volumes, Paris, 1823-26) contained the first trustworthy account of that district. In 1827 he became conservator of the Natural History Museum at Nantes. He published a *Voyage à Syouah*, and two volumes of researches on the life of the ancient Egyptians, Nubians, and Ethiopians.

**CAINOZOIC** ("recent life"), a geological term, synonymous with tertiary, introduced to avoid the confusion which attended the use of the terms primary, secondary, and tertiary, owing to the various meanings attached to them by geologists.

**ÇA IRA** ("It will go on!"), a popular song which arose in the fever of the French Revolution of 1789, so called from its refrain:

"Ah! ça ira, ça ira, ça ira!  
Les aristocrates à la lanterne!"

It became a French national song, and was styled the *Carillon National*. The original words (afterwards much changed) were due to a street singer named Ladre; the melody to Becourt, a drummer of the Grand Opera. The song was prohibited by the Directory in 1797.

**CAIRD**, **JOHN**, D. D., an eminent Scottish preacher, was born at Greenock in 1820. He studied at the University of Glasgow, and was locally well known as an able preacher, when a sermon delivered before the Queen in Crathie in 1855, and published under the title of *The Religion of Common Life*, quickly carried his fame into all parts of the Protestant world. It was pronounced by Dean Stanley to be the greatest single sermon of the century. In 1858 Dr. Caird published a volume of sermons, marked by beauty of language, strong thought, and intense sympathy with the spiritual aspirations of mankind. He received the degree of D. D. in 1860, was appointed Professor of Divinity in 1862, and in 1873 Principal of Glasgow University. In 1880 he published a work of great importance, *An Introduction to the Philosophy of Religion*.

**CAIRD**, **EDWARD**, a brother of the foregoing, born in 1835, and educated at the University of Glasgow. From Glasgow he passed as a Snell exhibitioner to Balliol College, Oxford, and became in 1864 Fellow and tutor at Merton. In 1866 he was appointed professor of Moral Philosophy at Glasgow University, where he has since exercised an unusual personal influence over the students. His works are a *Critical Account of the Philosophy of Kant* (1877), an excellent little book on *Hegel* in Blackwood's "Philosophical Classics," and an examination of *The Social Philosophy and Religion of Comte* (1885).

**CAIRNS**, **HUGH MACCALMONT**, LORD, an eminent Irish statesman and lawyer, born near Belfast in 1819, died in 1885. He was appointed attorney-general in 1866. He became a leader of the Conservative party in the House of Lords, and was twice lord chancellor of England.

**CAIRO**, a city of Illinois, and county-seat of Alexander county, situated on a low point of land at the junction of the Mississippi and Ohio Rivers. It was formerly subject to inundations, which retarded its growth; but extensive levees that have recently been erected at great expense afford ample protection against the encroachments of the rivers, and the city is now rapidly increasing in



numbers and wealth. Population in 1880, 9,011; in 1890, 10,044. See *Britannica*, Vol. IV, p. 647.

**CAITHNESS FLAGSTONES**, dark-colored bituminous schists, slightly micaceous and calcareous, valuable on account of their great toughness and durability for pavements, and various other purposes. They belong to the Old Red Sandstone, and contain abundant remains of fossil fishes.

**CAIVANO**, a town of Southern Italy, four miles north of Naples. Population, 10,832.

**CAJABAMBA**, capital of the province of Chimborazo, in Ecuador, situated 102 miles south of Quito, on the arid plateau of Topi, at an elevation of 9,480 feet. Population, 16,000. The former town of Riobamba, founded on this site in 1533 was in 1797 overwhelmed by an earthquake, in which 30,000 lives were lost.

**CALABASH**, or **GOURD-TREE**, a tree of the West Indies and the tropical parts of America, of the natural order *Bignoniaceæ*, sub-order *Crescentiaceæ*. In height and size it resembles an apple-tree; it has wedge-shaped leaves, large whitish fleshy flowers, and a gourd-like fruit, some times a foot in diameter. The wood of the tree is tough and flexible and is well adapted for coach-making, but the most useful part is the hard shell of the fruit, which is used instead of bottles, goblets, cups, water-cans, etc. The calabashes are sometimes polished, carved, dyed and otherwise ornamented.

**CALAIS**, a city of Maine, county-seat of Washington county, situated at the head of navigation on St. Croix River, opposite St. Stephen's, New Brunswick. Its chief industry is ship-building, and there is an extensive export trade in lumber, which is sawn in the vicinity. There are also a number of machine-shops and foundries. Calais is the seat of Calais Academy and of a high school.

**CALAMANDER WOOD**, a cabinet wood of great value, resembling rosewood, but surpassing it in beauty and durability. The tree which produces it is *Diospyros hirsuta*. See *EBONY*, *Britannica*, Vol. VII, p. 619.

**CALAMARY**, or **SQUID**, a name applied to numerous forms of cuttle-fish or *Cephalopoda*. See *Britannica*, Vol. VI, p. 735; Vol. XVI, p. 669; Vol. XXI, p. 609.

**CALAMBUCO**, a very durable timber tree of Luzon, somewhat resembling the teak, and much used in ship-building and in the manufacture of furniture and agricultural implements.

**CALAMIANES**, a group of islands in the Eastern Archipelago, in latitude about 11° 25' to 12° 20' north, and longitude 120° east. See *Britannica*, Vol. XVIII, p. 752.

**CALAMINE**, an ore consisting essentially of silicate of zinc. It occurs in small obtuse edged crystals, also compact and massive; it is white, brown, green, gray, and yellowish-white; is sometimes opaque and sometimes translucent. It is found in beds and veins in rocks of various kinds, but most commonly in limestone. See *Britannica*, Vol. XXIV, pp. 784, 785.

**CALAMINT** (*Calamintha*), a genus of plants of the natural order *Labiata*. *Calamintha officinalis*, is not unfrequent in England. It has whorls of flowers on many-flowered stalks, and serrated leaves, with an agreeable aromatic odor. It is used to make herb tea, and as a pectoral medicine.

**CALAMITES**, a group of fossil plants, which make their first appearance in the Devonian, occur abundantly in the Carboniferous, and seem to die out in the Permian strata. They are among the commonest and most characteristic fossil plants of the coal-measures. There is some doubt as to the affinities of these plants; but they are generally admitted to be allied to the recent *Equisetaceæ* or

horsetails, from which, however, they differ in certain points. It has not yet been fully decided whether they should be considered as a peculiar form of *Equisetaceæ*, or classed as a distinct but allied order. The gigantic decorticated stem is longitudinally ribbed and transversely jointed; in some stems long narrow branchlets proceed from the transverse joints, and in others branches bearing whorls of small branchlets or long narrow pointed leaves. Some of the species were provided with thick and others with thin bark. Calamites seem to have grown in dense brakes on low alluvial flats, and perhaps even in water.

**CALAMUS**, the reed pen which the ancients used in writing. It was made of the stem of a reed growing in marshy places, of which the best were obtained from Egypt. The stem was first softened, then dried, and cut and split with a knife, as quill pens are made. Even now the Orientals write with a reed, which the Arabs call *Kalām*. See *Britannica*, Vol. XVIII, p. 483.

**CALAMUS AROMATICUS**, one of the sweet-scented grasses of India, and one of the substances available for incense. The calamus of the Greeks and Romans came from the East, and to it the ancients ascribed important medicinal virtues. The calamus of America is the creeping root-stalk of the *Acorus calamus*, or sweet flag. See *Britannica*, Vol. XII, p. 718.

**CALANAS**, a town of Andalusia, Spain, situated about twenty-seven miles north of Huelva, and thirteen miles northeast of Tharsis, with which it was connected by rail in 1887. There is a large copper mine in the vicinity. Population, 3,991.

**CALANDO**, in music, an Italian expression, meaning diminishing by degrees from forte to piano. It differs from *decrecendo* or *diminuendo*, as the tempo at the same time is slightly retarded, but not so much as in *ritardando*. The proper performance of the calando is purely a matter of good taste and feeling, depending on the performer.

**CALANDRONÉ**, a wind instrument on which Italian peasants play simple melodies, and also sometimes accompany their national songs. It has the holes of the common flute, but the intonation is produced as in the common pipe.

**CALASPARRA**, a town of Spain, in the province of Murcia, forty miles northwest of the city of that name. The inhabitants, numbering about 3,000, are chiefly engaged in agricultural pursuits.

**CALATANAZOR**, a town of Aragon, Spain, about ten miles southwest of Soria. Population, 1,500.

**CALATRAVA-LA-VIEGA**, a ruined city of Spain, situated on the Guadiana, twelve miles northwest of Ciudad Real. In the Middle Ages it was a strongly fortified place, but nothing now remains except a single tower.

**CALBURGA**, a town of the Nizam's dominions in Hindoostan. It is situated on a tributary of the Beemah. It has been successively the capital of Hindoo and Mohammedan sovereignties. Population, 6,000.

**CALCAREOUS TUFA**, or **TUFA**, a mineral which in its chemical composition is nearly identical with limestone and marble, but is distinguished by its spongy and cellular structure. It is generally soft, brittle, and friable, but sometimes it is sufficiently hard to be used in building (see *Britannica*, Vol. XX, p. 808). Sometimes it incrusts animal and vegetable remains, as in "petrifying springs" (see *Britannica*, Vol. X, p. 270), and it is sometimes used as a filtering stone. The stalactites and stalagmites found in caverns are varieties of calcareous tufa.

**CALCASIEU**, a river of Louisiana, about 230 miles long and navigable for 100 miles. It rises in the western part of the State, flows south through Lake Calcasieu, and enters the Gulf of Mexico near the village of Cameron, ninety miles from Galveston.

**CALCEOLARIA**, a South American genus of plants of the natural order *Scrophulariaceae*. The calyx in this genus is 4-partite, corolla 2-lipped, the lower lip remarkably inflated so as to form a bag, and the shape of the whole in some species resembles that of a slipper. The art of the gardener has succeeded in producing varieties and hybrids which exhibit many rich and delicate tints. Some of the species are used in South America for dyeing. See *Britannica*, Vol. XII, p. 262.

**CALCIFEROUS EPOCH**, an epoch in the Lower Silurian system of North America. The division is characterized by the presence of calcareous sandstones and limestones, portions of which are very hard and siliceous, and contain geodes of quartz crystals. The Calcifereous epoch immediately succeeds the Cambrian period.

**CALCINATION**, or **CALCINING**, the process of heating or roasting in furnaces or in heaps the various metallic ores. It is resorted to as the first stage in the extraction of the majority of the common metals from their ores, and is essentially a process of oxidation.

**CALCIUM**, the metal present in chalk, stucco, and other compounds of lime. It is yellowish-white, can be rolled into sheets and hammered into leaves, and is intermediate between lead and gold in hardness. To retain its brightness it must be kept under the surface of naphtha. At a red heat it melts and burns with a dazzling, white light, accompanied by scintillations.

**CALDECOTT, RANDOLPH** (1846-86), an English artist, born at Chester, March 22, 1846. He was for sometime employed as clerk in a bank, first at Whitechurch and afterwards at Manchester. The success of his work in the London illustrated papers encouraged him to remove to the metropolis, where he soon proved himself without an equal in depicting the humors of animal life and the joys of the country-house and hunting-field. He contributed frequently to "Punch" and the "Graphic," and occasionally exhibited at the Royal Academy, the Dudley, and the Grosvenor Galleries. In 1882 he became a member of the Institute of Painters in Water-Colors. His health, however, soon gave away, and, after vain attempts to restore it by trips abroad, he died at St. Augustine, in Florida, Feb. 12, 1886. Randolph Caldecott will be remembered chiefly by the admirable *Caldecott's Picture-books*, which began in 1878 with *John Gilpin* and *The House That Jack Built*. He also illustrated Washington Irving's *Old Christmas* (1875), and *Bracebridge Hall* (1877); Mrs. Comyns Carr's *North Italian Folk* (1878), and several other well-known works.

**CALDER**, a river of Yorkshire, West Riding. It rises in a marsh on the borders of Lancashire, near Burnley, and after a course of forty miles joins the Aire near Pontefract. It forms a considerable portion of the canal route through Yorkshire and Lancashire, between the east and west coasts of England.

**CALDERON, PHILIP HERMOGENES**, R. A., painter, born of Spanish parentage, at Poitiers, in 1833. He studied in London and Paris, and regularly contributed to the Royal Academy from 1853, his subjects being chiefly historical or imaginative. He exhibited at the Paris International Exhibitions of 1867 and 1878, receiving at the former the first medal awarded to English art, and at the latter a first class medal and the Legion of Honor.

In 1887 he was appointed keeper of the Royal Academy.

**CALDIERO**, a decayed town of North Italy, about nine miles east of Verona. Its thermal springs were in repute as early as the first century of the Christian era, and continued to enjoy popularity until the sixteenth century, after which they gradually became neglected, and are now little visited.

**CALDWELL, CHARLES HENRY BROMEDGE**, naval officer, born in Hingham, Mass., June 11, 1823, died in Waltham, Mass., Nov. 30, 1877. He entered the navy as midshipman in 1838, and became lieutenant in 1852. He commanded the *Rasca* in 1862, when an attack was made on Forts Jackson and St. Philip, and led a party of men who cleared away the chain obstruction which prevented the Union gun-boats from passing the forts. Lieutenant Caldwell was in the action at Grand Gulf in 1862, and was soon afterwards made commander. He subsequently commanded the *Essex*, the *Glaucus*, and the *R. R. Cuyler*, and in 1874 was promoted to the rank of commodore.

**CALDWELL, JAMES**, American patriot and clergyman, born in Charlotte county, Va., in April, 1734, shot by a sentry near Elizabethtown, N. J., Nov. 24, 1781. He was a graduate of Princeton in 1759, and became pastor of a Presbyterian church in Elizabeth three years later. During the agitations preceding the Revolution he was active in arousing the spirit of rebellion, and was subsequently chaplain in the American Army. A monument commemorating his life and service was erected at Elizabethtown in 1846.

**CALDWELL, JOSEPH, D. D.**, educator, born in Lamington, N. J., April 21, 1773, died at Chapel Hill, N. C., Jan. 24, 1835. He graduated at Princeton in 1791, taught school in his native place and in Elizabethtown, and in 1796 was appointed to the chair of mathematics in the University of North Carolina. He henceforth devoted his energies to the upbuilding of this institution, and to him is due the merit of having saved it from ruin. In 1804 Dr. Caldwell became president of the University, which position he occupied until his death, with the exception of the years 1812-17.

**CALDWELL, MERRITT**, educator, born in Hebron, Oxford county, Me., Nov. 29, 1806, died in Portland, June 6, 1848. He graduated at Bowdoin in 1828, and in the same year became principal of the Maine Wesleyan Seminary. In 1834 he was elected professor of mathematics at Dickinson College, Pennsylvania, and in 1837 was transferred to the chair of metaphysics and English literature, which position he occupied until his death. Among his published works are: *The Doctrine of the English Verb*; *Philosophy of Christian Perfection*; and *Christianity Tested by Eminent Men*.

**CALDWELL, SAMUEL LUNT, D. D.**, educator, born in Newburyport, Mass., Nov. 13, 1820. He was educated at Colby University, Waterville, Me.; he subsequently graduated at the Newton Theological Institute, and became pastor of a Baptist church at Bangor, Me., and afterwards at Providence, R. I. He held a professorship in Newton Theological Institute, and in 1878 was called to the presidency of Vassar College; this position he resigned in 1885. Dr. Caldwell has published sermons, orations and lectures, and edited Vols. III and IV of *Publications of the Narragansett Club*.

**CALDWELL**, a city of Kansas, about twenty miles south of Wellington. It is the trade-center of a fertile agricultural district, and contains a number of grain-elevators and flouring-mills.

**CALDWELL**, or **LAKE GEORGE**, a village of New York, county-seat of Warren county, situated near



the head of Lake George, about sixty miles from Albany. It is a very popular summer resort. Its surroundings are picturesque and romantic; the lake is studded with numerous beautiful islets; and in the vicinity are several places of historic interest, including Fort George and Fort William Henry. The name Horicon, commonly supposed to be the original Indian name of the Lake, was a fanciful invention of Cooper, the novelist.

**CALDWELL**, a town of Ohio, county-seat of Noble county, situated about thirty miles east of Zanesville and thirty-five miles north of Marietta. It has a sash and door factory, and in the vicinity are found coal, iron, oil, and salt.

**CALEDONIA**, a village of Minnesota, county-seat of Houston county, situated about thirty-two miles south of Winona. It contains manufactories of wagons and sleighs, and is the center of an important local trade and the seat of Caledonia Academy.

**CALEDONIA**, a village of North Dakota, and county-seat of Traill county, situated at the confluence of Goose River with the Red River of the North. It is an important shipping-point for grain.

**CALEDONIA SPRINGS**, a village of Ontario, about ten miles south of L'Orignal. It contains a number of alkaline medicinal springs noted for their efficacy in the cure of rheumatic and cutaneous diseases.

**CALEDONIA CANAL**. See *Britannica*, Vol. IV, p. 787.

**CALENDER**, or **KALENDER**, a Persian word (meaning "greater") applied to members of an order of dervishes founded in the fourteenth century. The Calenders are wandering preachers, who hold that sin defiles the body only, and can be removed by ablutions. The members of the order, even during the life-time of its founder, were remarkable for licentiousness and debauchery.

**CALENDS**, the first day of each Roman month. See *CALENDAR*, *Britannica*, Vol. IV, p. 665.

**CALENTURE**, a Spanish term for a species of temporary delirium or fever occurring on board a ship in hot climates, and probably due to the effect of exposure to the direct rays of the sun.

**CALGARY**, a town of the Northwest Territory of Canada, with station on the Canadian Pacific

Railway, 2,262 miles west of Montreal. It stands 3,380 feet above the sea-level, in a broad valley between the Bow and Elbow Rivers, and is a trading-center for a wide district. It dates from 1884.

**CALHOUN**, **WILLIAM BARRON**, LL. D., born in Boston Mass., Dec. 29, 1796, died in Springfield, Mass., Nov. 8, 1865. He graduated at Yale, entered the legal profession, and attained much popular favor. In 1825 he was sent to the legislature, where he served for ten years; was in Congress from 1835 to 1843; was Secretary of State (Mass.) from 1848 to 1851; bank commissioner from 1853 to 1855; presidential elector in 1844, and in 1859 was elected mayor of Springfield.

**CALL**, **SANTIAGO DE**, a town of Colombia, situated on a tributary of the Rio Cauca, 3,300 feet above the sea. It is connected with Buenaventura by rail, and has considerable trade with that port. Population, 13,000.

**CALIANO**, a small town of the Austrian Tyrol, on the left bank of the Adige, about nine miles south of Trent. It figures in history as the place where the Austrian Archduke Sigismund won a single victory over the Venetians in 1487. Being a place of considerable military importance, it was also contested in the campaigns of 1797 and 1809.

**CALIBRE**, or **CALIBER**, a technical name for the diameter of the bore of a fire-arm, whether a piece of ordnance or a small-arm. If the weapon is rifled its calibre is measured, not from the bottom of the grooves, but from the smooth surface between them, technically called the "lands." In the United States the calibre of a fire-arm is expressed in decimal parts of an inch; thus, what is commonly called a 44-calibre rifle is one of .44-inch; the calibre of a cannon is expressed either by the diameter of its bore or by the weight of a solid round shot which it will carry. In Great Britain calibre is expressed as in the United States, with the exception of the heavy guns, which are denominated from their weight; as, a 38-ton gun or a 100-ton gun.

**CALIFORNIA**, a village of Missouri, county-seat of Moniteau county, situated in the center of the State, in the midst of a rich agricultural and mineral-producing district. It contains a number of mills for the manufacture of flour, paper, and woolen goods.

**CALIFORNIA**, **STATE OF**. Area (official 1890), 158,360 square miles. Population (1890), 1,208,130. Capital, Sacramento, with a population in 1890 of 26,272. For the early history, physical geography, climate, mines, and productions of California, see *Britannica*, Vol. IV, pp. 694-706.

California is rapidly advancing not only in population, but also in respect of numerous industries. In its gold products it is the first State in the Union. Since 1848, and up to Jan. 1, 1891, its gold and silver reached a total of \$1,367,450,000. Its mineral products in 1890 were valued at \$23,850,000. Its manufacturing products in 1890 were valued at \$116,218,000; in 1890, at \$165,000,000. The deposits in its banks in 1890 reached the large total of \$171,229,531; and the assessed value of property, a total of \$1,060,890,296—an amount nearly double the total valuation in 1880. Its wealth *per capita* is the largest of any State in the Union.

On Jan. 1, 1890, California reported 4,500 miles of railway, with an assessed valuation of \$40,248,000. Its chief city, San Francisco, claims to be the third largest commercial city in the United States, and to be practically out of debt.

In 1890 the estimated area of arable land in California embraced 38,000,000 acres; cultivated, 2,500,000; forests, 20,000,000 acres. Its hay, cereal, and root crops in 1890 were valued at \$70,000,000; its bean crop reached a total of 1,000,000 cents; its barley, 16,000,000 bushels; its hops, 40,000 bales; its wheat crops, 27,000,000 cents, of which there were exported 13,266,409 cents, valued at \$17,600,000; its flour exported at 1,201,304 barrels, valued at \$4,000,000.

The fruit crops of the State have increased with extraordinary rapidity. The raisin output of 1890 was reported at 2,000,000 boxes, or 400,000,000 pounds; its prune crop at 15,000,000 pounds; its dried fruits shipped East, at 66,318,000 pounds—more than ten times the quantity shipped East in 1880; oranges shipped East in 1890-91, at 4,000 car-loads, in 1889 at 3,187 car-loads; total green fruits shipped east in 1890 at 105,000,000; in 1880 the amount was 5,180,000. Not only do the orange and grape thrive in California, but also the olive, fig, almond, and walnut; the State is also a very large producer of honey.

The grape districts of California have an area of about 225,000 acres.

The United States Census of 1890 showed an increase in the population, during the last decade, of 343,436, the net increase being about 36.73 per cent. The subjoined table shows the population of the State and its comparative increase by counties:

| Counties.            | 1890.   | 1880.   | Increase. |
|----------------------|---------|---------|-----------|
| Alameda.....         | 93,864  | 69,976  | 80,888    |
| Alpine.....          | 667     | 539     | 126       |
| Amador.....          | 10,320  | 11,384  | d. 1,064  |
| Butte.....           | 17,939  | 18,721  | d. 782    |
| Calaveras.....       | 8,832   | 9,094   | d. 212    |
| Colusa.....          | 14,640  | 13,118  | 1,522     |
| Contra Costa.....    | 13,515  | 12,525  | 990       |
| Del Norte.....       | 2,592   | 2,584   | 8         |
| El Dorado.....       | 9,232   | 10,683  | d. 1,451  |
| Fresno.....          | 32,036  | 9,478   | 22,548    |
| Humboldt.....        | 23,469  | 15,512  | 7,957     |
| Inyo.....            | 3,444   | 2,928   | 616       |
| Kern.....            | 9,806   | 6,501   | 4,207     |
| Lake.....            | 7,401   | 6,596   | 505       |
| Lassen.....          | 4,239   | 3,340   | 899       |
| Los Angeles.....     | 01,454  | 33,381  | 68,073    |
| Marin.....           | 13,072  | 11,324  | 1,748     |
| Mariposa.....        | 3,787   | 4,539   | d. 552    |
| Mendocino.....       | 17,012  | 12,900  | 4,812     |
| Merced.....          | 8,085   | 5,656   | 2,429     |
| Modoc.....           | 4,986   | 4,399   | 587       |
| Mono.....            | 2,002   | 7,499   | d. 5,497  |
| Monterey.....        | 18,637  | 11,302  | 7,335     |
| Napa.....            | 16,411  | 13,235  | 3,175     |
| Nevada.....          | 17,369  | 20,523  | d. 3,454  |
| Orange.....          | 13,589  | .....   | 13,589    |
| Placer.....          | 15,101  | 14,232  | 869       |
| Plumas.....          | 4,933   | 6,180   | d. 1,247  |
| Sacramento.....      | 40,339  | 34,390  | 5,949     |
| San Benito.....      | 6,412   | 5,584   | 828       |
| San Bernardino.....  | 25,497  | 7,736   | 17,711    |
| San Diego.....       | 34,987  | 8,618   | 26,369    |
| San Francisco.....   | 298,997 | 233,959 | 65,038    |
| San Joaquin.....     | 28,629  | 24,349  | 4,280     |
| San Luis Obispo..... | 16,072  | 9,142   | 6,930     |
| San Mateo.....       | 10,087  | 8,669   | 1,418     |
| Santa Barbara.....   | 15,754  | 9,513   | 6,241     |
| Santa Clara.....     | 48,005  | 35,039  | 12,966    |
| Santa Cruz.....      | 19,270  | 12,802  | 6,468     |
| Shasta.....          | 12,133  | 9,492   | 2,641     |
| Sierra.....          | 5,051   | 6,623   | d. 1,572  |
| Siskiyou.....        | 12,103  | 8,610   | 3,553     |
| Solano.....          | 20,946  | 18,475  | 2,471     |
| Sonoma.....          | 32,721  | 25,926  | 6,795     |
| Stanislaus.....      | 10,040  | 8,751   | 1,289     |
| Sutter.....          | 5,469   | 5,159   | 310       |
| Tehama.....          | 9,916   | 9,301   | 615       |
| Trinity.....         | 3,719   | 4,993   | d. 1,280  |
| Tulare.....          | 24,574  | 11,281  | 13,293    |
| Tuolumne.....        | 6,082   | 7,848   | d. 1,766  |
| Ventura.....         | 10,071  | 5,073   | 4,998     |
| Yolo.....            | 12,684  | 11,772  | 912       |
| Yuba.....            | 9,686   | 11,284  | d. 1,648  |

Of the 54 counties in California, nearly all produce grapes, the larger portion of them yielding wine for home consumption or for export. There is an established demand for this wine to the amount of 1,000,000 gallons per month from this country alone, making 12,000,000 gallons annually, and an exportation to foreign countries of 311,920 gallons in 1889, valued at \$217,093. The State may be divided into three grape-growing districts: the coast, which includes Sonoma, Lake, Napa, Alameda, Santa Clara, and Santa Cruz counties; the Sierra Nevada foothill and Sacramento Valley district, which includes Placer, El Dorado, Calaveras, Tuolumne, Yuba, Yolo, Butte, Sacramento, Tehama counties; and the Southern district, which includes San Joaquin, Merced, Fresno, Tulare, Kern, Ventura, Santa Barbara, San Bernardino, Los Angeles, and San Diego counties.

In the first district the finer grades of white and red dry wines are made. The choice variety of the French and German types seem to come nearer to reproducing themselves there than in any other district. In that district are successfully grown the finest varieties of French champagne grapes which yield a handsome profit to the producer. There is one cellar in the district having a capacity of 800,000 bottles, pro-

ducing champagne by natural fermentation in the bottle. The champagne industry in California is constantly growing, with the promise of a bright future. While wine is the leading viticultural product, the district produces also fine table grapes. Grapes for table use and raisins are also extensively grown in the second district, a large portion of the new plantings being for raisins.

In Napa county, in the first district, there was in 1890 a grape acreage of 30,763 acres. There were 143 wine cellars in Napa, many of them of recent construction and containing all the appliances for the manufacture and handling of wines. There were 3,000,000 gallons of wine made in that county during the year 1889.

Sonoma county, in this district, had in 1889 21,683 acres of bearing vineyards. The same conditions exist there relative to the quality of grapes and wines produced as in Napa. The ravages of phylloxera were felt in Sonoma and Napa in 1874, and a great many vineyards were destroyed. It is now generally believed that the destruction caused by the phylloxera can be stayed by growing the native resistant stock and grafting upon that the foreign vinifera. In Sonoma county in 1889 there were produced about 1,756,300 gallons of wine and 250,000 gallons of brandy.

Santa Clara county, in this district, contains some 12,500 acres of bearing vineyards, and should enjoy a reputation for fine white and red wines equal to Sonoma and Napa. This and Santa Cruz county in 1889 produced 2,544,000 gallons of wine. As yet the phylloxera has troubled the vineyards but little in comparison with the counties before mentioned. There is said to be a deep gravelly bed underlying this whole surface, in which the growers say the phylloxera does not work with success.

Alameda county, in the first district, has 6,500 acres of bearing vines, and produces a type of wine resembling the white and red wines of France; and in this part of the district, known as the "Livermore district," a high grade of Sauternes and claret is produced. The geological formation of the valleys and slopes of the Mount Diablo range more nearly reproduce the soil conditions that characterize the department of the Gironde in France than any other section on the coast. In this district there were produced in 1889 some 60,000 gallons of wine, noted more for the quality than for the quantity which it produces. This is comparatively a new wine district, and has grown up within the last decade. The first systematic planting of high grade grapes began in 1883.

There is in the second district a great viticultural interest, embracing table grapes, raisins, sweet and dry wines, and brandies, excelling in the latter. Sacramento, Placer, El Dorado, Tehama, Yuba, Butte, and Yolo counties produce large quantities of table grapes, and quite a quantity of raisins is shipped from some of these counties. Tehama has the largest vineyard in the world (8,800 acres), to which the manager says 1,000 acres of new vines are to be added within a year. There were in the distillery on this vineyard in April, 1890, when visited by the special agent of the Census Office, 300,000 gallons of brandy and 1,000,000 gallons of wine. Another large vineyard, the second largest in the State, contains 1,800 acres, and is situated at Colusa, Sacramento county. The winery belonging to the vineyard has a capacity of 600,000 gallons. Many table grapes are shipped from this vineyard to the Eastern markets.

In the third district, near Stockton, in San Joaquin county, is located one of the largest vineyards and wineries. Fine brandies are made in that district, and also ports and some excellent clarets. Fresno county contained in 1891 about 25,000 acres of bearing vines and 15,000 acres of new plantings, the larger portion of which were grown for raisins. There were, however, a great many gallons of wine and brandy made in that county. The wines were mostly sweet, and of excellent quality. The raisin pack in 1889 was 626,595 boxes; the wine produced, 1,200,000 gallons. The California "Wines and Vines," speaking of the Muscatel de Gordo Blanco, the true raisin grape, says: "The soil seems to impart a vigor to the vines that is unknown elsewhere in the world. The second crop is often very nearly equal to the first, and the third comes before the leaves fall off." More than half the raisin grapes grown in California are produced in Fresno county. San Bernardino county, in the same district, is also principally devoted to the growing of raisin grapes. There were 9,562 acres of bearing and 4,125 acres of non-bearing vines, and the raisin pack for 1889 amounted to 375,000 boxes. Two wineries in San Bernardino county produced 279,000 gallons of wine in 1889. There were also shipped from this district 1,700 tons of table grapes.

There were also counted in 1889 in Los Angeles county 25,820 tons, or 51,640,000 pounds of grapes for wine, and 1,000 tons or 2,000,000 pounds of grapes for table purposes. The wines in that county are justly celebrated, and were the first shipped from California to the Eastern markets. That county excels in its sherrys, ports, and brandies. There were 200,000 boxes of raisins packed in 1889, the new disease having reduced the product about one-half. The product of Orange, a county lately formed from portions of Los Angeles county, is included in the above figures.

In San Diego county there is an acreage of 6,000 bearing and 7,500 non-bearing vines. Of the latter, 6,000 were just coming into bearing in 1889, and did not add much to the product. While this shows a fair increase in the growth of the industry during the last four years, the increase is accounted for by the fact that the new disease that was so injurious in Los Angeles did not affect San Diego county. It is in the El Cajon



valley of San Diego county that the most progress has been made in viticulture. There are 27,000 acres adapted to fruit growing, and 3,000 acres of bearing raisin vineyards in El Cajon. The raisins from this valley are among the finest produced in California. The product of the El Cajon valley in 1889 was 75,000 boxes; in the balance of San Diego county the pack was 75,000 boxes; in all, 150,000 boxes. Another successful branch of viticulture in this district is the shipment of table grapes to the Eastern markets. Many of the elevated localities are so free from frost that grapes can be left on the vines until January.

As it has been noted that California has the largest vineyard in the world, it may be well to state that she has also the smallest. It is a vineyard consisting of a single vine, in Santa Barbara county. It was planted by a Mexican woman about sixty-eight years ago, and has a diameter one foot from the ground of 12 inches, its branches covering an area of 12,000 feet, and it produces annually from 10,000 to 12,000 pounds of grapes of the Mission variety (many bunches weighing six and seven pounds), the crop being generally made into wine. The old lady who planted this one-vine vineyard died in 1865 at the age of 107.\*

In harmony with its genial climate, fully described in Britannica, Vol. IV, California possesses many scores of mineral springs of great variety in respect of temperature and chemical analysis. Over 200 of such springs have already been opened, located chiefly in the Coast range, though there are also many mineralized springs in the Sierra and in the desert regions in the southeastern part of the State. Dr. Winslow Anderson, of San Francisco, undertook not long since the task of collecting descriptive notes, with veritable and practical analyses of the most prominent springs of the State, and has given to the public, in a highly interesting volume, the results of his investigations. He pronounces the California mineral springs to be equal in attractiveness and value, to those of any European or other health resorts. See AMERICAN HEALTH AND PLEASURE RESORTS, in these Revisions and Additions.

**CALISTOGA**, a picturesque town of California, situated near the Petrified Forest, about sixty-five miles north of San Francisco. It is noted for its mineral springs, and is a popular summer resort.

**CALIVER**, a matchlock or firearm about midway in size and character between an arquebus and a musket. It was small enough to be fired without a rest or support.

**CALIXTINES**, the more moderate section of the Hussites in Bohemia. They took their name from the leading article of their confession (published in 1421), which was a demand for the giving of the cup (calix) in communion to the laity. Their tenets were conceded by the articles of Basel in 1433, and they were for a time quite a prominent party; but they gradually became less strict in principle, and had ceased to be of importance by the beginning of the sixteenth century.

**CALKING**, the operation of driving oakum or untwisted rope into the seams of a ship to render them water-tight.

**CALL**, a military musical term meaning a signal on the drum, pipe or bugle. The metal whistle used by a boatswain and his mate on ship-board is also a "call."

**CALLA**, an aquatic or marsh-loving genus of *Araceæ*, of a single species, *Calla palustris*, the water-arum. It has white spathes, cordate heart-shaped leaves, flowers crowded up to the extremity of the spadix, and red berries. It is widely distributed through the cold marshes of Europe and North America, and acquires some economic importance in Lapland and parts of Russia, from the fact that its root-stock when deprived of its acrid properties by cooking, is a source of starchy matter used in bread-making. The well-known and beautiful *Richardia*, the calla of house cultivation, was formerly included in this genus. See Britannica, Vol. XII, p. 264.

**CALLANDER**, a village in Perthshire, on the left bank of the Teith. It lies in a beautiful and romantic situation surrounded by high mountains and Highland lakes. Population, 1,921.

**CALLENDER**, JOHN, historian, born in Boston, Mass., in 1706, died in Newport, R. I., Jan. 26, 1748.

He graduated at Harvard and became pastor successively of a Baptist church in Boston, in Swansea, Mass., and in Newport, R. I. At the latter place he was a member of a society called "Company of the Redwood Library." He delivered an address in 1738 entitled, *An Historical Discourse on the Civil and Religious Affairs of the Colony of Rhode Island and Providence Plantations, from the First Settlement to the End of the First Century*. This was, for one hundred years, the sole history of Rhode Island. Mr. Callender published a series of papers relative to the history of the Baptists in America.

**CALLERNISH**, a district on the west coast of the island of Lewis, 16 miles from Stornoway, remarkable for its pre-historic stone circles, of which there are four at no great distance from one another. See Britannica, Vol. XIV, p. 492.

**CALLICHTHYS**, a genus of physostomatous bony fishes of the family *Siluridæ*, having the body almost entirely covered by four rows of large, hard, narrow, scaly plates. The head is also protected by bony plates. The twelve species of this freshwater genus are natives of South America. See Britannica, Vol. XXII, p. 69.

**CALLIGONUM**, a genus of plants of the natural order *Polygonææ*, having a quadrangular fruit winged at angles. The best known species is a succulent shrub found on the sandy steppes near the Caspian Sea, where its acid shoots and fruit often serve to allay thirst. The roots afford a nutritive gum.

**CALLINGER**, one of the hill forts of Bundelcund, elevated 1,200 feet above the adjacent plain. From its position and size it must at one time have been a place of great strength. At the base of the rock stands a town of the same name, which, though much decayed, still bears testimony of its ancient grandeur.

**CALLIPERS**, compasses with curved legs, used by turners and other workmen for measuring the diameters of cylindrical, spherical, and other curved work.

**CALLOVIAN**, a division of the Jurassic system, represented in England by the Kellaways Rock.

**CALLUS**, a term employed in old surgical works and still used, popularly, to indicate the new growth of osseous tissue about the extremities of fractured bones, which serves to unite them.

**CALMS**, or **CALM LATITUDES**, those parts of the ocean near the equator which are subject to total absence of wind for long periods together.

**CALOPHYLLUM**, a genus of trees of the natural order *Guttifera*, natives of warm climates. Some of the species yield valuable timber and also supply valuable resins, while the seeds of other varieties produce a fixed oil used in lamps and for other purposes.

**CALORIC**, a term given to a supposed imponderable fluid to which was formerly ascribed the phenomenon of heat, and hence used loosely for heat.

**CALORIMETER**, an instrument for measuring the specific heat of a body; the determination being effected by ascertaining the quantity of ice at zero which is turned into water by the transference to it of heat from the body under examination. See Britannica, Vol. XX, p. 132.

**CALOTTISTS** (*Le Regiment de la Calotte*), a society of witty and satirical men, in the times of Louis XIV, who were headed by two officers in the king's body-guard named Torsac and Aimon. Their name was taken from the cap which formed the symbol of the society. Their amusement consisted in sending to any public character who had made himself ridiculous a "patent" authorizing him to wear the *calotte* as a covering for the weak part of his head.

\* See U. S. Census Bulletin of Viticulture of 1890.

As the society became audacious, and did not spare even royalty itself, it was suppressed.

**CALOTYPE**, the name given to a photographic process devised about 1840 by Dr. Fox Talbot. It is not now in use.

**CALOVIVS**, **ABRAHAM**, the chief representative of controversial Lutheran orthodoxy in the 17th century; born at Mohrungen, in East Prussia, April 16, 1612, died at Wittenberg Feb. 25, 1686; he was successively professor at Königsberg, preacher at Danzig, and professor at Wittenberg. He waged war incessantly on Arminian, Socinian, Reformed, and Catholic doctrines, and was very bitter against Calixtus. He was six times married, the last time in his seventy-second year to a young daughter of his colleague, Quenstedt. Calovius's chief writings are his *Systema Locorum Theologicorum* (12 volumes, 1655-77), and *Historia Syncretistica* (1682).

**CALOYERS** ("good old men"), a general name for the monks of the Greek Church.

**CALPE**, one of the pillars of Hercules, identified with Gibraltar. See *Britannica*, Vol. X, p. 585.

**CALPENTYN**, a long and narrow peninsula on the west side of Ceylon. The neck is so low as to be overflowed during the northeast monsoon, so that it is transformed into an island.

**CALTABELLOTTA**, or **CALATA BELLOTTA**, a town of Sicily, 10 miles northeast of Sciacca, most picturesquely situated around an ancient castle, which crowns a steep rock overhanging a stream. Caltabelotta was long a Saracen town, and its name is said to be derived from Kalaat-el-Ballut ("the castle of the cork-trees"). Population, 6,178.

**CALTROP**, or **CALTHORP**, in military warfare, was a piece of iron with four prongs, each prong about four inches in length. When it was wished to check the approach of the enemy's cavalry or besiegers in the ditch of a fortification caltrops were thrown around. Owing to their shape one prong was sure to stand upright, and horses or men stepping upon them became disabled. See *Britannica*, Vol. XI, p. 703.

**CALUIRE-ET-CUIRE**, a town of France, in the department of the Rhone, on the left bank of the Saone, about three miles from Lyons. Population, 9,182.

**CALUMBA**, or **COLOMBO**, used in medicine, is the root of *Jateorhiza palmata*, a menispermaceous climber of Eastern Africa. Its bitterness and other properties are ascribed to the presence of columbin, berberin, and columbic acid. It is a useful, mild tonic and stomachic. American calumba root is obtained from *Frasera Walteri*, a gentianaceous biennial, and has properties like those of gentian.

**CALUMET**, a village of Michigan, situated in the copper region, near the northernmost point of the Upper Peninsula. It contains a celebrated copper mine, often spoken of as the richest in the world. See *Britannica*, Vol. XVI, p. 239; Vol. XXIII, p. 816.

**CALUSO**, a town of Piedmont, Italy, 11 miles south of Ivrea, and connected with Turin by railway. Population, 6,161.

**CAL'ARY**, the scene of our Saviour's crucifixion, an eminence which lay just outside the ancient Jerusalem. The name is a translation into Latin of the Hebrew word Golgotha, signifying a "skull," perhaps given because the mount was a place for public execution, or because it was shaped like a human skull.

**CALVARY**, in Roman Catholic countries, a representation of the various scenes of the passion and crucifixion of our Lord. It consists of three crosses with the figures of Christ and the thieves, usually life-size, surrounded by figures representing the personages who took part in the crucifixion.

**CALVELLO**, a town in the province of Basilicata, Italy, pleasantly situated on a hill-slope about 13 miles south of Potenza. It has two convents. Population, 5,800.

**CALVERLEY**, **CHARLES STUART**, English parodist, born Dec. 22, 1831, died at Folkestone, Feb. 17, 1884. He was educated at Harrow, Oxford and Cambridge, and in 1865 was called to the bar, and settled in London, but a fall on the ice in the winter of 1866-67 put an end to what promised to be an exceptionally brilliant career. One of the most gifted and scholarly men of his time, and unrivaled as a humorist, Calverley will be remembered by his two little volumes, *Verses and Translations* (1862), and *Fly Leaves* (1872).

**CALVERT**. For an account of George Calvert, first Lord Baltimore, see *Britannica*, Vol. IV, p. 713. Cecil Calvert, second Lord Baltimore, was born about 1603, and succeeded to his father's title in 1632. In 1633 he sent an expedition to his American territory, under the charge of his brother Leonard, and thus became the real founder of the colony of Maryland. Leonard Calvert, the first governor of the colony, was born about 1606, and died in 1647. The title became extinct upon the death of Frederick Calvert, the seventh Lord Baltimore in 1771.

**CALVERT**, **GEORGE HENRY**, author, born in Prince George county, Md., Jan. 2, 1803, died in Newport, R. I., May 24, 1889. He was a great-grandson of the first Lord Baltimore. Having graduated at Harvard he studied at Göttingen, Germany, and on his return resided in the neighborhood of Baltimore, edited the "Baltimore American," and then removed to Newport, R. I., and in 1853 became mayor of that city. He wrote for periodicals and published several books.

**CALVERT**, a prosperous town of Texas, about 85 miles northeast of Austin. It contains manufacturing of cotton-seed oil, and is the business center of a fertile agricultural district.

**CALX**, a Latin term for quicklime. As quicklime is produced by burning limestone, the alchemists applied the term calx to the substance of a metal or mineral that remains after being subjected to extreme heat and calcination to the process.

**CALYCANTHUS**, a genus of *Calycanthaceæ*; a small order, of which only a few species are known, natives of North America and Japan. They are square-stemmed, aromatic shrubs, with purple flowers, which have the odor of strawberries. The most common species in the United States is *Calycanthus floridus*, or Carolina allspice.

**CALYCIFLORE**, a term introduced by De Candolle to include those natural orders of dicotyledons in which the sepals and petals are separate, as in *Thalamifloræ*, but in which the stamens, instead of being hypogynous, are perigynous or epigynous. It includes the *Leguminosæ*, *Rosacæ*, *Saxifragacæ*, and other related orders.

**CALYDONIAN BOAR**: in Grecian mythology, a frightful animal sent by the goddess Artemis to lay waste the fields of Ceneus, king of Calydon, because he had omitted a sacrifice to her. The king being absent on the Argonautic expedition, no one dared to face the monster, until Meleager, the son of Ceneus, with a band of heroes, pursued and slew him.

**CALYMENE**, a genus of the fossil order *Trilobites*, found in the Silurian rocks.

**CALYPTRÆA**, a genus of mollusks sometimes popularly known as chambered, cup-and-saucer, bonnet or slipper limpets. It is the typical genus of the family *Calyptæidæ*. The shapes vary considerably. Some ten living species are known,



mostly from warmer waters. See *Britannica*, Vol. XVI, p. 650.

**CALYX**, in botany, the external envelope of the flower. See *BOTANY*, *Britannica*, Vol. IV, p. 131.

**CAM**, or **GRANTA**, a river of England, which rises in Essex and flows northeast through Cambridge. It gives its name to the town of Cambridge, which stands upon it, and below which it is navigable.

**CAMARILLA**, a Spanish word, literally "a little chamber," signifies throughout Europe the influence exercised on the state by the favorites of a monarch in opposition to the advice of his legitimate ministers. It first obtained this meaning in the time of Ferdinand VII of Spain.

**CAMAYEU** and **MONOCHROME**, terms by which painting in one color is designated. The ancients painted both in gray and in red pictures of several tints, but where the natural colors of the objects are not copied, are said to be *en camayeu*. As one color generally prevails we speak of blue, red, yellow, green camayeu.

**CAMBERWELL BEAUTY** (*Vanessa Antiopa*), a butterfly very common in the central and southern parts of Europe. The wings are of a deep purplish-brown color, with a band of black containing a row of blue spots around the brown and a pale yellow margin dappled with black specks. The colors are rich and velvety. The margin of the wings exhibits tooth-like angularities. The caterpillar is black with white dots and a row of red spots down the back, and is rough with soft spines. It feeds on the willow.

**CAMBIST**, an Italian word for money-changer, or one who is versed in the operation of exchange. The word is also used figuratively as the title of a book in which moneys, weights, measures, etc., of various nations are given in the equivalents of some particular one.

**CAMBRIA**, the ancient name of Wales, the *Britannia Secunda* of the Romans. The name is derived from that of *Cimbri* or *Cymri*, by which the Welsh have always called themselves.

**CAMBRIC**, a general term applied to the finest and thinnest of linen fabrics. It is said to be derived from *Cambray*, a city of France, formerly of Flanders, where the goods were first manufactured. Scotch cambric is really a muslin, being made of cotton with the fiber twisted very hard, to imitate real or linen cambric. See *CAMBRAY*, *Britannica*, Vol. IV, p. 726.

**CAMBRIDGE**, a village of Maryland, county-seat of Dorchester county, situated on the Choptank River, about 50 miles southeast of Annapolis. It is an important shipping-point for oysters, herring and shad; contains several canning factories and establishments for the manufacture of tobacco, flour and staves, and is the seat of two excellent academies.

**CAMBRIDGE**, a village of New York, about 35 miles northeast of Albany. It contains manufactures of machinery, flour, leather and lumber, and is the seat of Cambridge Washington Academy.

**CAMBRIDGE**, a village of Ohio, county-seat of Guernsey county, situated in an agricultural and mining region, about 60 miles north of Marietta. Coal is found in the vicinity, and the town contains important manufactures of flour, iron, pottery and salt.

**CAMBRIDGE**, an important and rapidly growing city of Massachusetts, and one of the county-seats of Middlesex county. See *Britannica*, Vol. IV, p. 732. The city comprises four distinct sections, each still bearing its original title—namely, Old Cambridge, North Cambridge, Cambridgeport, and East Cambridge. Old Cambridge, as its name implies, marks the spot where the city began its

growth. Harvard square is nearly in the center of this portion of the city. At the east end of this square still stands the famous Wadsworth House, built in 1726, in which the successive presidents of Harvard College lived for 120 years. Near this central spot is the old village cemetery, in which were buried many of the most eminent men in the early days of Cambridge. Cambridge Common contains about 20 acres. At the western end still stands a venerable elm, surrounded by an iron fence, with a plain granite slab, which records that "Under this tree Washington first took command of the American Army, July 3, 1775." North Cambridge extends in a northerly direction from Harvard University, and, lying on the Charles River, is a point of much commercial importance. Cambridgeport lies between the end of West Boston Bridge and Old Cambridge, and abounds with manufacturing industries. East Cambridge, that section formerly known as Lechmere's Point, is opposite the northwestern portion of Boston. It is the most recently settled portion of the city, and contains the court-house, jail, house of correction, and other public buildings. The first printing office in America north of Mexico was established at Cambridge in 1639. Population in 1880, 52,669; in 1890, 69,837.

**CAMBRIDGE CITY**, a village of Indiana, situated on the Whitewater River, 15 miles west of Richmond. It contains extensive manufactures of railroad cars, machinery, furniture, sash and blinds, flour, lumber, and malt-products.

**CAMBRIDGE GREENSAND**, a name given to certain "coprolite beds" met with in Cambridgeshire, which were at one time supposed to represent the Upper Greensand. The beds in question are now ascertained to occur on the horizon of the base of the Chalk Marl. See *COPROLITES*, *Britannica*, Vol. VI, p. 353.

**CAMBUSLANG**, a large mining village of Lanarkshire, four miles southeast of Glasgow. Here a revival, known as the "Camb'slang Wark," was held under Whitefield in 1741. Population, 5,538.

**CAMDEN**, a city of New Jersey, on the Delaware River, opposite Philadelphia. It is an important railway city, seven railroads having their termini here—namely, Camden and Amboy, Camden and Burlington County, Camden and Atlantic, Philadelphia and Atlantic City, West Jersey, and Camden, Gloucester and Mt. Ephraim. The city has increased rapidly during the last 20 years, both in population and business; in part, however, by annexation of a portion of Newton. The water works which supply the city with water from the Delaware River are at Pavonia, about one mile north of Camden. Population in 1880, 41,659; in 1890, 58,274. See *Britannica*, Vol. IV, p. 734.

**CAMDEN**, a thriving town of Arkansas, county-seat of Ouachita county, situated at the head of low-water navigation on the Ouachita River. It is a shipping point for cotton, and an important center of trade. It contains several establishments for the manufacture of flour, iron and woolen goods.

**CAMDEN**, a flourishing village of Delaware, three miles south of Dover. It is the seat of an academy. The chief industry is the canning of fruits.

**CAMDEN**, a village of Maine, situated on the west shore of Penobscot Bay, about nine miles north of Rockland. It contains numerous manufactures of railroad cars, car-wheels, pumps, spikes, anchors and woolen goods, and is extensively engaged in commerce, ship-building, and the exportation of lime.

**CAMDEN**, a village of New York, about 18 miles northwest of Rome. It contains important manu-

factories of leather, furniture, woolen goods, rakes and iron.

CAMDEN, an old historical town of South Carolina, county-seat of Kershaw county. It is an important educational and trade-center. See *Britannica*, Vol. IV, p. 734.

CAMEL, a caisson-like apparatus for rendering a vessel navigable in shoal water. It was invented by the Russian engineer De Witte (1790-1854), and is often used between Kronstadt and St. Petersburg.

CAMELFORD, a village in the northwest of Cornwall, near the source of the Camel, 14 miles from Launceston. It lies in a high and hilly tract, and is said to have been the scene of a battle between King Arthur and his nephew Mordred, A. D. 542, in which both were slain. Population, 800.

CAMELOT, a steep hill of Somersetshire, England, near Ilchester, in the parish of Queen's Camel, identified by tradition with one of the capitals of the legendary King Arthur. There are some remains of remote antiquity in the vicinity.

CAMEL'S THORN (*Alhagi*), a genus of plants of the natural order *Leguminosae*, containing a number of herbaceous or half-shrubby species. These plants are of great importance on account of the food which they afford for camels, as they are natives chiefly of the deserts of the East. See *Britannica*, Vol. XV, p. 493.

CAMERLENGO ("chamberlin"), the cardinal having charge of the secular interests of the papacy.

CAMERON, JAMES, soldier, born in Maytown, Lancaster county, Pa., March 1, 1801, killed at the battle of Bull Run, July 21, 1861. He entered his brother Simon's printing office in Harrisburg in 1820; edited the Lancaster "Political Sentinel" in 1827; studied law; served as sutler in the Mexican war, and became colonel of the 79th New York regiment at the outbreak of the civil war.

CAMERON, JAMES DONALD, Senator and son of Simon Cameron, born in Middletown, Dauphin county, Pa., May 14, 1833. After graduating at Princeton he became successively clerk, cashier and president of the Middletown bank. From 1863 to 1874 he was president of the Pennsylvania railroad, and was influential in extending this road to Elmira, N. Y., after the war, thus making steam connection between the lakes and Chesapeake Bay. Mr. Cameron is also interested in coal, iron and manufacturing industries. Under President Grant he held the portfolio of war in 1876; in 1877 he resigned to take his father's place in the United States Senate. He was reelected Senator in 1879, 1885 and 1891.

CAMERON, JOHN HILLYARD, Canadian statesman, born in Beaucaire, Languedoc, France, April 14, 1817, died in Toronto, Nov. 14, 1876. He was educated at Kilkenny, College, Ireland, and in Toronto; entered the legal profession; was elected to the Canadian parliament in 1846, and appointed solicitor-general in the same year. He served for 16 years in the legislative body, and during that time was a prominent mover in a number of important bills, one of which secured better postal facilities between Canada, Great Britain and the United States. He was the author of several legal works, and was one of the commissioners appointed for the revision of the Statutes of Upper Canada in 1840, and the consolidation of the statutes in 1856.

CAMERON, MALCOLM, Canadian statesman, born at Three Rivers, Canada East, April 25, 1808, died in Ottawa, June 1, 1876. He was entirely self-educated, and rose by his own efforts from the position of stable-boy to positions of honor and profit under the Canadian government. He began his political career in 1836, as representative in the Upper

Canada Assembly and was successively inspector of revenue, cabinet officer, president of the council, commissioner of public works, postmaster-general and member of House of Commons from South Ontario.

CAMERON, SIMON, statesman, born in Lancaster county, Pa., March 8, 1799, died there June 26, 1889. He learned the printer's trade when only nine years of age, and in 1820 had risen to be editor of a newspaper in Doylestown, Pa. Two years later he edited another paper in Harrisburg. He held the office of adjutant-general for his State, and in 1845 was elected by the Democratic party as their representative in the United States Senate. In 1856, having become a member of the Republican party, he was sent to the United States Senate. When Abraham Lincoln was nominated for the Presidency, Senator Cameron was a favorite candidate for the first place on the ticket, and also for the second; but the Pennsylvania delegation was not agreed, and he failed of nomination. President Lincoln called him to his Cabinet as Secretary of War. When he served his second term in the Senate his loyalty was questioned on account of his advocacy of peace; but in the Cabinet he urged more aggressive measures than the President was prepared to sanction. He was in favor of arming fugitive slaves, and instructed Gen. Butler to this effect. In January, 1862, he resigned his position and was sent as minister to Russia, where he helped in securing the friendship of that nation at this trying period. He resigned in November, 1862, and four years later was returned to the United States Senate. He was elected to a fourth term, but resigned in his son's favor in 1877. During his political career he was practically the Republican dictator in his State, and was called the "Czar of Pennsylvania politics."

CAMERON, VERNEY LOVETT, C. B., African explorer, born at Radipole, near Weymouth, July 1, 1844. He entered the navy in 1857, and served in the Mediterranean, the West Indies, and the Red Sea, and on the East Coast of Africa, taking part in the Abyssinian expedition and in the suppression of the slave trade. In 1872 (see *Britannica*, Vol. I, p. 249), he was appointed to the command of an East-Coast expedition to relieve Livingstone; and, starting from Bagamoyo in March, 1873, in August, at Unyanyembe, he met Livingstone's followers bearing his remains to the coast (see *Britannica*, Vol. X, p. 194). After making arrangements for their safe arrival he proceeded to Ujiji, where he found some of Livingstone's papers and a map, which he forwarded to Zanzibar. He then made a survey of Lake Tanganyika, which he found to be disconnected with the Nile system. Taking a southerly route, he reached the Portuguese settlement of Benguela on the West Coast, Nov. 7, 1875, whence he returned to England. Created a C. B. and raised to the naval rank of commander in 1878, he traveled overland to India; and in 1882, with Sir Richard Burton, he visited the Gold Coast. Among his works are *Across Africa* (1877), and *Our Future Highway to India* (1880).

CAMERON, a village of Missouri, about forty miles west of Chillicothe. It is an important railroad and trade-center, and has excellent educational facilities.

CAMERONIAN REGIMENT, a name given to the 26th regiment of British infantry, which had its origin in a body of Cameronians. In 1689 the Convention at Edinburgh, taking advantage of the zeal and courage of the members of this religious body, induced a number of them to assist in the revolution, on the understanding that the special object of the corps was to recover and establish the work of Reformation in Scotland. The regiment, with the youthful Lord Angus as colonel and William



Cleland, the poet, as lieutenant-colonel and actual commander, was sent northwards to quell the insurrection. On Aug. 21, 1889, the Cameronians, 1,200 strong, defended themselves against 5,000 Highlanders, and although Cleland fell early in the fight, his work was accomplished; for, in Macaulay's words, "the Cameronians had finished the war." See CAMERON, RICHARD, *Britannica*, Vol. IV, p. 742.

CAMERONIANS, a religious body in Scotland, followers of Richard Cameron, officially called Reformed Presbyterians. In 1681 societies were organized bearing the names of the districts to which they belonged, for the purpose of defense against the oppression of the government and for the maintenance of worship. They refused to accept the indulgence granted to the Presbyterian clergy in the times of Charles II (see *Britannica*, Vol. XIX, p. 516), lest by accepting they should be understood to recognize his ecclesiastical authority. The political position of the Cameronians was very peculiar, since, declining to recognize any laws or institutions which they conceived to be inimical to those of the kingdom of Christ, they refused to take the oath of allegiance. In 1860 there was an attempt to prevent the members exercising the franchise, but in 1863 it was decided not to exercise discipline to the extent of suspension and expulsion on such questions. In consequence of this decision, to which the majority adhered, ten or twelve congregations seceded. In 1876 the larger body formally united with the Free Church. The principles of the Cameronians are now, therefore, distinctively represented by the few congregations which seceded in 1863. See RELIGIOUS DENOMINATIONS in the United States.

CAMEROON, a German colony on the West Coast of Africa, extending along 9° 8' east longitude from the Cross River to the mouth of the Rio del Rey, below 3° north latitude; the limits in the interior, which is almost unexplored, have not been fixed. The name is derived from the Cameroon River, which enters the Bight of Biafra opposite Fernando Po by an estuary over 20 miles wide; the stream is for a considerable distance nearly a mile broad, has at some seasons a current of 5 miles an hour, and its yellow-waters may be traced far out at sea. The country is very fertile, abounding in ebony, redwood, and palm trees, and a variety of tropical fruits, while the production of cotton and ivory is very considerable. The climate is very trying to Europeans, and traders generally live in hulks and only store their goods on shore. The natives belong to the Bantu group. Their kings, Bell and Akway, practically wholesale merchants, made considerable trouble by their refusal to permit the natives of the interior to trade directly with Europeans. As England declined to assume the protectorate, the Germans were appealed to, and on July 14, 1884, the German flag was hoisted at Cameroon and a governor appointed.

CAMETA, a town of Brazil, on the left bank of the Tocantins, which joins the estuary of the Amazon from the south. It is 85 miles to the southwest of Para or Belem. It has a fertile district attached to it, which contains 20,500 inhabitants.

CAMLET, properly a fabric made from the hair of the Angora goat. It is also made wholly of wool, or of wool mixed with cotton or linen, and spun hard.

CAMOGLIA, a town of Northern Italy, on the Gulf of Genoa, about 13 miles southeast of the city of that name. It has about 6,000 inhabitants, chiefly engaged in fishing.

CAMORRA, the name of a secret society in the former kingdom of Naples under the Bourbon government, the members of which were called Camorristi. It was first publicly known about 1820. It

had a central rendezvous in every large provincial town, and twelve such in the city of Naples; and for each of these sections there was a chief, with powers of absolute command, and a treasurer with charge of the common fund. This organization, partly political and partly of the nature of a standing vigilance committee, plundered and terrorized the country for many years. It was tolerated under King Ferdinand II for political reasons, but the government of Francis II endeavored to put down the society, and the police received instructions to seize and transport all known members of it. Those who remained entered into alliance with the Garibaldian committee, and essentially aided in the expulsion of the Bourbons. The organization still retains a nominal existence, but is of no importance.

CAMPANA, LA, a town of Andalusia, Spain, situated on the Madre Viegua, about 87 miles northeast of Seville. It has about 5,500 inhabitants, chiefly engaged in agricultural pursuits, and in weaving and brick-making.

CAMPANARIO, a town of Estremadura, Spain, 62 miles southeast of Badajoz. It has manufactories of linen and ropes, and a trade in the agricultural produce of the neighborhood. Population, 5,400.

CAMPANHA, a town in the Brazilian province of Minas Geraes, 150 miles northwest of Rio de Janeiro. It is surrounded by bare hills, in which there has been much mining for gold, and large herds of cattle are reared on the lowlands. Population, 6,000.

CAMPANULA ("a little bell"), a genus of plants including the blue-bell or hare-bell, the Canterbury-bell, etc. See HARE-BELL, *Britannica*, Vol. XI, p. 478.

CAMPANULARIA, a common genus of hydroids and type of a family, *Campanulariæ* (see *Britannica*, Vol. XII, p. 561). The delicate stem bearing the colony of polyps may be simple or branched; the nutritive individuals are surrounded by transparent, bell-shaped sheaths, within which they may be retracted. The genus is common in North European seas and in the Mediterranean.

CAMPBELL, an ancient and illustrious Scottish family, to which genealogists have chosen to assign an Anglo-Norman origin, deriving its surname from the Latin *De Campo Bello*. According, however, to the Duke of Argyll, it is purely Celtic, of Scots-Irish origin; and *Cambel*, as the name was always formerly written, is just the Celtic *cam beul*, "curved mouth." Sir Duncan Campbell, of Lochow, created Lord Campbell in 1445, and his descendants, the ducal house of Argyll, are noticed in *Britannica* under Argyllshire. From his younger son, Sir Colin Campbell of Glenorchy, are descended the earls and marquises of Breadalbane; and from the younger son of the second Earl of Argyll, who fell at Flodden in 1513, the earls of Cawdor (created 1827).

CAMPBELL, ALEXANDER, theologian, son of the preceding, born at Shane's Castle, county Antrim, Ireland, in June, 1786, died in Bethany, W. Va., March 4, 1866. He was educated at the Glasgow University; emigrated to the United States, and became pastor of a Presbyterian church in Washington county, Pa. The father and son became dissatisfied with Calvinistic doctrines, and in 1810 organized a church at Brush Run, Pa., whose creed was the Bible, and whose form of baptism was immersion. Alexander Campbell in 1827 organized the church which is variously called "Disciples of Christ," "Christians," "Church of Christ," and "Campbellites." The sect increased, in numbers, and in 1880 had a membership of 500,000. Its founder was in 1823 the editor of "The Christian Baptist," afterwards called "The Millennial Harbinger." Mr. Campbell believed slavery permissible to Christians, and according to Scriptural

authority. He wrote much for the religious press, and published many religious books. He was a scholarly man, and the founder, and first president of Bethany College.

CAMPBELL, ANDREW, inventor, born near Trenton, N. J., June 14, 1821, died in Brooklyn, N. Y., 1890. He received only a common-school education, and was early obliged to care for himself. He learned carriage-making, invented a brush-drawer's vise, built the first omnibus of St. Louis; built the "Great Western" omnibus in 1846—the largest vehicle of the kind ever constructed; built the wooden bridge over Cedar River, Iowa, which was the longest single-span bridge of wood ever made (558 ft. between abutments), and in 1851 he turned his attention to the improvement of printing-presses. His first successful press was built by A. B. Taylor & Co. He went into their employ, became a practical printer, familiarized himself with the business, and invented many little devices; the endless band-fly used in the Bullock press was his invention. He built presses for Frank Leslie, Harper & Brothers, and J. C. Ayer & Co.; for the latter the machine built was the first super-imposing press, and with it 120 almanacs could be printed in a minute. He built for Frank Leslie the first automatic press. He also invented a very fine country-newspaper press. He was the originator of the first press which, in one continuous operation, printed, inserted, pasted, and folded a paper. He took out nearly fifty patents.

CAMPBELL, BARTLEY, dramatist, born in Allegheny City, Pa., Aug. 12, 1843, died in Middletown, N. Y., July 30, 1888. He began the study of law, which he relinquished and became a "Leader" reporter. He founded the "Evening Mail" of Pittsburgh in 1868, the "Southern Magazine" of New Orleans in 1867, and three years later was official reporter of the Louisiana House of Representatives. He took up the writing of dramatic pieces in 1871, and among his plays are the following: *Through Fire; Peril; Fate; The Virginian; On the Rhine*; an adaptation of the German comedy *Ultimo*, which he named *The Big Bonanza*; *Heroine in Rags*; *How Women Love*; *My Partner*; *The White Slave*; *My Geraldine*; and *Paquita*. *The Big Bonanza* netted a San Francisco theater \$16,000 in a month. *My Partner* achieved success in New York, being the first of Mr. Campbell's plays which gave satisfaction in that city. In 1886 the author became insane.

CAMPBELL, GEORGE WASHINGTON, statesman, born in Tennessee, in 1768, died in Nashville, Feb. 17, 1848. He graduated at Princeton in 1794; served in Congress from 1803 to 1809, and from 1811 to 1814; became secretary of the treasury in 1814, and was appointed minister to Russia in 1818. He was a member in 1831 of the French claims commission.

CAMPBELL, HELEN STUART, author, born in Lockport, N. Y., July 4, 1839. She was educated in Warren, R. I., and at Mrs. Cook's Seminary in Bloomfield, N. J. She began at an early age to contribute sketches to the newspapers, and made a study of the housekeeping problem, employments for women, and the condition of the poor in cities. She has written valuable articles on these subjects. Among her published books are: *The Ainslie Series*; *His Grandmothers*; *Six Sinners*; *Unto the Third and Fourth Generation*; *The Easiest Way in Housekeeping and Cooking*; *The Problem of the Poor*; *The American Girls' Home-Book of Work and Play*; *Under Green Apple Boughs*; *The What-to-do-Club*; *Mrs. Herndon's Income*; and *Miss Melinda's Opportunity*. She was literary editor of "The Continent" from 1881 to 1884, and in 1886 contributed a series of articles for the New York "Tribune" on the working-women of that city.

CAMPBELL ISLAND, a lonely spot of volcanic origin to the south of New Zealand, discovered in 1810. It was used as an observatory during the transit of Venus in 1874. Though it is mountainous and measures only 36 miles round, it has valuable harbors and a rich and rare flora.

CAMPBELL, JAMES, statesman, born in Philadelphia, Pa., in 1813; became a lawyer; was judge of the court of common pleas from 1841 to 1850; attorney-general of the State in 1852, and appointed post-master-general by President Pierce in 1853.

CAMPBELL, JOHN ARCHIBALD, jurist, born in Washington, Ga., June 24, 1811. He graduated at the State University when in his sixteenth year, and was admitted to the bar by special act of legislature, as, at the time he passed his legal examination, he was not twenty-one years old. Upon removing to Montgomery, Ala., he practiced law, and frequently sat in the legislature. President Pierce gave him the appointment of associate justice of the United States Supreme Court, and this office he held from 1853 to 1861. He believed in the right of secession, but opposed the civil war. Under the Confederacy he was assistant secretary of war. The peace commission of February, 1865, which met at Fortress Monroe, numbered him as one of the Southern representatives. After the Confederacy had been abolished, Mr. Campbell was arrested and detained in Fort Pulaski; when discharged on parole he resumed the practice of law in New Orleans.

CAMPBELL, JOHN FRANCIS, of Islay, Scottish folk-lorist, born Dec. 29, 1822, died at Cannes, Feb. 17, 1885. Educated at Eton and the University of Edinburgh; he held offices at court, and was afterwards secretary to the light-house and coal commissions. Much of his life was spent in travel. He was an enthusiastic Highlander, a profound Gaelic scholar, and a man of singularly lovable nature. An obelisk was raised to his memory in 1887 on the summit of Cnoc-na-Dab, a hill in Islay, near his birthplace. Campbell's great work is his *Popular Tales of the West Highlands* (four volumes, Edinburgh, 1860-62), a very important contribution to the scientific study of folk-tales. He gave much attention also to scientific studies, and published several scientific works.

CAMPBELL, JOHN MCLEOD, D. D., Scottish theologian, born at Kilninver, in Argyll, in 1800, died at Roseneath, Feb. 27, 1872. Sent to Glasgow University at the age of eleven, he was licensed to preach by the presbytery of Lorne in 1821, and was ordained minister of Row, near Helensburg, in 1825. His views on the personal assurance of salvation, and on the universality of the atonement, brought upon him a charge of heresy which led to his deposition by the general assembly in 1831. See *Britannica*, Vol. XXI, p. 538. Campbell bore this heavy trial with the greatest charity and patience. Refusing to form a new sect, he for two years labored in the Highlands as an evangelist, and for twenty-six years preached quietly without remuneration to a regular congregation that gathered round him in Glasgow. His health failing, the remainder of his life was spent in retirement. In 1868 his University gave him the degree of D. D., and in 1871 a testimonial and address were presented to him by men of nearly every religious denomination in Scotland. He was the author of three of the most valuable of modern English theological books: *Christ the Bread of Life* (1851), *The Nature of the Atonement* (1856), and *Thoughts on Revelation* (1862).

CAMPBELL, THOMAS, clergyman, born in Ireland, Feb. 1, 1763, died in Bethany, W. Va., Jan. 4, 1854. The Campbell's of Argyle were his ancestors. He studied at Glasgow University, and was trained for the ministry under the Scottish establishment.



Soon after becoming a minister he joined the "seceders," and soon sailed for the United States. He identified himself with the associate synod of North America and assumed the care of destitute churches in Western Pennsylvania. His son joined him in 1809, and thereafter the two were united in church work. The elder Campbell labored to assist his son until blindness and the infirmities of age obliged him to give up work.

**CAMPBELL, TIMOTHY J.**, of New York city, a lawyer, born in County Cavan, Ireland, in 1840. He came to America in 1845; received a common school education; became a printer, and was employed by several daily newspapers. In politics a Democrat, he was elected a member of the assembly from New York city in 1868, 1869, 1870, 1871, 1872, 1873, and 1875; studied law during his first term, and entered the profession in November, 1869. He was elected justice of the Fifth District civil court in New York city in 1875, and served six years. He was again elected a member of the assembly in 1883, and afterward a State Senator. He was elected a representative from the Eighth Congressional District of New York to the Forty-ninth Congress, to fill the vacancy caused by the resignation of S. S. Cox, and was reelected to the Fiftieth Congress. In 1890 he was elected from the same district to the Fifty-second Congress.

**CAMP EQUIPAGE**, a general name for all the tents, furniture, fittings, and utensils carried with an army, applicable to the domestic rather than to the war like wants of the soldier.

**CAMPER, PETER** (1722-89), anatomist, born at Leyden, May 11, 1722; studied there and in 1750 became professor of medicine at Francker; in 1755 at Amsterdam, and in 1765 at Groningen. In 1773 he resigned his post, and, on being elected a member of the State council in 1787, removed to The Hague, where he died, April 7, 1789. Camper was distinguished, not only for the services he rendered to anatomy, surgery, obstetrics, and medical jurisprudence, but also as a promoter of fine arts. His work on the connection of anatomy with the art of drawing was an important contribution to the theory of art.

**CAMPHILENE**, an artificial variety of camphor obtained from turpentine, by acting thereon with the dry vapor of hydrochloric acid, and keeping the whole at a low temperature by immersing the vessel in a freezing mixture. A solid substance is produced which separates in white crystalline prisms, and has the taste and agreeable aromatic smell of common natural camphor.

**CAMPHINE**, a term applied in commerce to purified oil of turpentine, obtained by carefully distilling the oil over quicklime, or by rectifying it over dry chloride of lime to render it quite free from rosin.

**CAMPINAS, SAN CARLOS DE**, a town of Brazil, situated on a fertile plain, 44 miles northwest of São Paulo. There are large coffee and sugar plantations in the surrounding district. Population, 12,000.

**CAMPION**, the common name of plants belonging to the genera *Lychnis* and *Silene*, as moss-campion, meadow-campion, etc.

**CAMP-MEETINGS**, gatherings of devout persons held usually in thinly populated districts, and generally continued for a week or more, with a view of securing prolonged and uninterrupted religious exercises. Assemblies of like kind have been more or less usual at various periods in the history of the Christian Church; but it was in connection with Methodism in America that such meetings became especially prominent. The practice of holding such meetings originated in 1799, and is still common.

**CAMPOBELLO**, an island belonging to New Brunswick. It is situated off the coast of Maine, about two miles from Eastport. It is a popular summer resort. Lead and coal are found in the island. The chief industry is fishing.

**CAMPO DE CRIPTANA**, a town of Spain in the province of, and about 50 miles northeast of the city of Ciudad Real. It has manufactories of coarse cloths, and some trade in corn and fruits. Population, 5,255.

**CAMPOS, SÃO SALVADOR DOS**, a town in the Brazilian province of Rio de Janeiro, situated on the Parahyba, which is navigable for small craft to this point, 30 miles from its mouth. It has fine wharves, and considerable trade in coffee, sugar, brandy, and timber. Population, 15,000.

**CAMPO SANTO, HOLY FIELD**, the Italian and Spanish name for a cemetery or burying-ground, especially for one inclosed by an arcade.

**CAMPO-FORMIO**, a village of Northern Italy, six miles southwest of Udine, celebrated for the treaty of peace here concluded, Oct. 17, 1797, between Austria and the French Republic. See *Britannica*, Vol. III, p. 131; Vol. X, p. 610; Vol. XIII, p. 485; Vol. XVII, p. 200.

**CAMPVERE**, a fortified town of the Netherlands, in the province of Zealand, in Walcheren Island, 4 miles northeast of Middleburg. It has a port on the Veersche Gat, a tract of water separating Walcheren from North Beveland. The town is now in a state of deplorable decay, but it still possesses remnants of its early prosperity. It has one calico factory. Population, 900.

**CAMTOOS, or GAMTOOS**, a river of the east division of Cape Colony, Africa, two hundred miles in length. It rises in the Nieuwveld mountains, and flows through the inland district of Beaufort, falling into the inlet of the sea which is immediately to the west of Algoa Bay.

**CAMUS, ARMAND GASTON**, a prominent character in the French Revolution, born at Paris in 1740, died in 1804. On account of his superior knowledge in ecclesiastical law he was elected advocate-general of the French clergy. He was a zealous and ascetic Jansenist, and possessed of extraordinary firmness of character. In 1789 he was elected to the States-General. He gained possession of and published the so called *Red Book*, giving accounts of court expenditure, which was highly disadvantageous to the court and its ministers. In 1793, when he was commissioned to make prisoners of Dumouriez and other generals suspected of treason, he was taken prisoner with his colleagues and delivered to the Austrians. After an imprisonment of two years and a half, he was exchanged for the daughter of Louis XVI. On his return to Paris he was elected to the Council of Five Hundred, became its president in 1796, resigned a year later, and devoted his time to literature.

**CAMWOOD, or BARWOOD**, a dye-wood which yields a brilliant but not permanent red (see *Britannica*, Vol. VII, p. 576). It is the wood of *Baphia nitida*, a tree of the natural order *Leguminosae*, sub-order *Cæsalpinieæ*, a native of Angola and Sierra Leone.

**CANADA, DOMINION OF**, a colonial government under the sovereignty of the British Empire. For its history, geography, government, productions, commerce and earlier statistics, see *Britannica*, Vol. IV, pp. 765-82.

A portion of the North-western Territories were, in 1882, divided into four districts—Assiniboia, 95,000 sq. m.; Saskatchewan, 114,000 sq. m.; Alberta, 100,000 sq. m.; and Athabasca, 122,000 sq. m. The district of Keewatin, between Manitoba and Ontario, and stretching north to Hudson Bay,

was created in 1876 out of the Territories, and erected into a separate government under the Lieutenant-Governor of Manitoba; it has an area as at first defined of about 450,000 square miles, but part of it at least is now included in the territory recently awarded to Ontario.

The official census of April 3, 1881 (the latest taken of the whole Dominion to the date of this writing), gave area and population of the several provinces as follows:

| Political Divisions.             | Square miles | Total Pop. | Density per sq. mile. |
|----------------------------------|--------------|------------|-----------------------|
| Prince Edward Island.....        | 2,133        | 108,891    | 54                    |
| Nova Scotia.....                 | 20,907       | 440,572    | 22                    |
| New Brunswick.....               | 27,174       | 321,233    | 12                    |
| Quebec.....                      | 188,688      | 1,359,027  | 7                     |
| Ontario.....                     | 201,733      | 1,323,228  | 19                    |
| Manitoba.....                    | 123,300      | 65,354     | 0.5                   |
| British Columbia.....            | 341,305      | 49,459     | 0.14                  |
| Territories and Arctic Islands.. | 2,665,252    | 56,446     | 0.02                  |
| Total.....                       | 3,570,392    | 4,324,810  | 1.24                  |

To the above area should be added 140,000 square miles for lakes, rivers, etc., giving a total area of 3,610,257 square miles. An estimate for 1890 makes a total population of over five millions.

A census of Manitoba taken in 1886 showed that the population was 108,640. If allowance is made for the territory which was taken from Manitoba and added to Keewatin and Ontario in 1883 (the area in 1881 was 123,200 square miles), the rate of increase since that year has been 74.49 per cent.

The district of Keewatin, between Manitoba and Ontario, and stretching north to Hudson Bay, was created in 1876 out of the Territories, and erected into a separate government under the Lieutenant-Governor of Manitoba; a portion of Manitoba was added in 1883, and it has now an area of about 400,000 square miles.

The number of immigrants who arrived in Canada in 1885 was 105,096; in 1886, 122,581; in 1887, 175,579; in 1888, 174,474; and in 1889, 176,462. These numbers are inclusive of those who arrived from the United States.

Except in British Columbia, all the provinces of the Dominion have one or more universities and several colleges, which prepare for university degrees. There are in all about 16 degree-granting bodies in the Dominion, with about 24 colleges attended by about 7,000 students. In 1888 there were 15,139 public schools, and 869 high and superior schools, attended by over a million of pupils.

The total actual receipts for the financial year ending June 30, 1889, were \$71,147,964, and the total expenditures the same. The total public debt of the Dominion July 1, 1890, was \$282,993,751, and the net debt \$233,375,641.

The active militia includes the volunteer and the marine militia. The reserve militia consists of all the men between the ages of 18 and 60 not serving in the active militia of the time being, with certain exemptions. The number of men to be drilled annually is limited to 45,000, and the period of drill to 16 days every year. On Jan. 1, 1890, the active militia consisted of 36,598 officers and men, comprising 43 troops of cavalry, 18 batteries of field artillery, 43 of garrison artillery, 3 companies of engineers, and 640 companies of infantry and rifles. There were also nine permanent corps and schools of instruction, the strength of which is limited to 1,000 men, viz., one school of cavalry, three of artillery, four of infantry, and one mounted infantry. There is also a royal military college at Kingston, founded in 1875,

since which time 74 cadets have received commissions in the imperial army. A small-arms ammunition factory is in operation in Quebec. There is at present no active marine militia, the naval defenses of the country being under the care of the imperial authorities.

The trade of the Dominion is chiefly with the United States and Great Britain. The total wheat crop in 1888 was estimated at 33,000,000 bushels, of which 1,081,169 bushels were exported. In 1889 the total wheat crop of Manitoba was, owing to the dry season, not much over 7,000,000 bushels. The only complete agricultural returns are from the province of Ontario, and the average produce per acre from 1883 to 1889 inclusive was: Fall wheat, 19.4; spring wheat, 15.7; barley, 26.1; oats, 35.3; rye, 16.4; peas, 20.4; corn, 64.9; potatoes, 118.7. Cheese is becoming an important farm production, the export being nearly 270 per cent. more in 1888 than in 1874. In 1888 there were in the Northwest Territories 115 ranches, comprising 3,113,878 acres.

In 1888, according to government returns, the lumber production in Canada reached a total of 1,688,453,768 feet board measure, the dues on which were \$2,500,000.

The total value of the produce of the fisheries in 1889 reached \$17,655,226. Of the total yield in 1889, cod was valued at \$3,618,240; herrings, \$2,498,357; lobsters, \$1,484,488; salmon, \$3,141,925; whitefish \$685,096. Of the total yield in the same year, \$6,346,722 belonged to Nova Scotia; \$3,067,039 to New Brunswick; \$1,876,194 to Quebec; \$888,431 to Prince Edward Island; \$3,348,068 to British Columbia; \$1,963,123 to Ontario; and \$167,679 to Manitoba and the Northwest Territories.

The chief mining districts of Canada are Nova Scotia, British Columbia, Quebec, Ontario, and the Northwest Territories. The total value of the mineral products in 1888 was \$16,500,000. The principal product is coal, of which 2,658,134 tons, valued at \$5,259,832, were mined in 1888. Among the other minerals produced were gold, \$1,098,610; iron, \$1,592,931; petroleum, \$755,571; bricks, \$1,036,746; building stone, \$641,712; copper, \$667,543; silver, \$395,377.

The railway returns in January, 1891, showed a total of 12,628 miles of railway in operation and 26,616 miles of telegraphs. Shipping cleared during the previous year, 16,054,221 tons, with an average annual increase of 1,000,000 tons. The sea-going trade was done by vessels, with a total register of 9,356,601 tons. In 1889, of her foreign trade 26 per cent. was carried in Canadian bottoms. The vessel tonnage owned by Canada was 1,089,642 tons. The postal service included 7,838 post-offices.

Among enterprising projects engaging public attention in Canada for many years was that of revolutionizing the carrying trade between the old and new world. The project was to build a railway from Winnipeg in Manitoba to Fort Churchill, on the western coast of Hudson Bay, and to connect there with steamers which would navigate Hudson Strait, and by sailing along a circle of the earth much shorter than the parallels of latitude away to the south, abbreviate very greatly the length of the ocean voyage. The project was sanctioned five years ago by the legislature of Manitoba, and with the aid of a liberal provincial subsidy the work was begun. The road was to be 650 miles in length, stretching away to the northward till the shore of the great inland sea was reached. Of this distance 250 miles would lie through a fairly fertile country, which would yield some local traffic, but the other 400 miles would traverse a region suitable only to support the wandering Esquimaux and reindeer. With this subsidy 45 miles of the road were built, and the project placed upon the market. The grain of the American continent was to be stored in elevators at Fort Churchill, and thence transferred to Europe. The Dominion government was appealed to for aid. It decided, before granting the aid asked for, to send an expedition to Hudson Bay in order to determine whether the proposed route through Hudson Strait and the Bay and the building of a port at Fort Churchill were feasible. The *Alert*, of Arctic fame, was fitted out, and under command of Lieutenant Gordon, of the Royal Navy, sailed from Halifax on the voyage of inquiry. Three trips were made in as many years. The first two failed of their object by reason of the obstruction of large fields of ice in the Strait and Bay. In the third, after great difficulty and peril,



Fort Churchill was reached; but the report of the commander on his final return was so discouraging to the hopes of the projectors of the new line that the whole project for the present seems to be abandoned.

The chief public events during the year 1890 were the elections in six provinces, resulting as follows (Jan. 20): New Brunswick, 22 Government, 16 Opposition, 3 Independents, sustaining Blair coalition ministry; (30) Prince Edward Island, 18 Conservatives, 12 Liberals, sustaining the McLeod ministry; (May 21), Nova Scotia, 27 Liberals, 17 Conservatives, sustaining the Fielding ministry; (June 5), Ontario, 55 Liberals, 36 Conservatives, sustaining the Mowat ministry; (13), British Columbia, the Robson ministry receiving 8 majority; (17), Quebec, 73 Liberals, 27 Conservatives, sustaining the Mercier ministry. In Ontario the Equal Rights Association, which favored the abolition of Roman Catholic schools, opposed the government. In Manitoba the government stopped printing official reports in French, and the legislature passed a bill abolishing Roman Catholic separate schools and setting up a uniform public school system. In the Dominion parliament at Ottawa, in February, several days' debate on a motion to abolish French as the official language in the N. W. Territories resulted in adoption, by 149 votes to 50, of the motion of Sir John Thompson, leaving the matter to be settled by the people of the territories.

Early in 1891 the Dominion government dissolved parliament, and the general elections, held March 5, resulted in the success of the government party (the Conservatives) by a decreased majority. The members of the new parliament were classified as follows: Conservatives, or Government, 117; Liberals, or Opposition, 95; re-elections to be held, 3; total seats, 215.

During the last few years two important international questions of grave interest engaged the attention of the Dominion government—one of them being the right of Canada to participate in the seal fisheries of Bering Sea. The United States claimed to have secured, in the purchase of Alaska from Russia, the exclusive right to those fisheries, a right which Russia had previously claimed and had effectively maintained. In 1887, the British schooner *Seymour*, immediately hailing from Canadian ports, was seized by a United States vessel for seal fishing in Bering Sea, 59 miles from land, and was condemned to confiscation by the District Court of Alaska. The motion of its owner for an appeal to the United States Supreme Court was denied on the ground of a defect in the Alaska statute, which failed to give the Supreme Court jurisdiction over appeals from the Alaska District. Later, however, the Alaska court consented to the appeal. In January, 1891, the case was withdrawn from the Supreme Court at the request of the owners of the schooner, and application for a writ was made prohibiting the sale of the vessel. This application was presented by the Attorney-General of Canada, acting in the name of the government of Canada and the government of Great Britain. Considerable feeling was the result of the effort to take the case out of the hands of the Executive and treaty-making department of the Washington government, especially as the British government had not consented to be bound by the decision of the U. S. Supreme Court. Subsequently, however, a friendly correspondence between the interested governments resulted in an agreement to submit the question at issue to arbitration.

The other question of special interest in Canada and in the United States is that growing out of the fishery treaties between the two countries. A new treaty recently formulated by the executive governments of Great Britain and the United States, relating to the fishery question, failed through the non-approval of the United States Senate. See TREATIES, in these Revisions and Additions.

The following is the official census of the population of Canada taken in 1891. The report bears date Aug. 31, 1891:

## POPULATION OF CITIES.

|                | 1881.   | 1891.   | Increase. |
|----------------|---------|---------|-----------|
| Montreal       | 215,237 | 216,650 | 61,413    |
| Toronto        | 96,196  | 181,220 | 85,024    |
| Quebec         | 62,446  | 63,090  | 644       |
| Hamilton       | 35,960  | 48,980  | 13,020    |
| Ottawa         | 31,307  | 44,154  | 12,847    |
| St. John       | 41,353  | 39,179  | .....     |
| Halifax        | 36,100  | 38,556  | 2,456     |
| London         | 26,266  | 31,977  | 5,711     |
| Winnipeg       | 7,985   | 25,642  | 17,657    |
| Kingston       | 14,091  | 19,264  | 5,173     |
| Victoria, B.C. | 5,925   | 16,241  | 10,916    |
| Vancouver      | .....   | 13,685  | 13,685    |

\* The population in the 1881 column includes the same boundaries as in the 1891 column, and consequently differs in those cases where annexations have taken place since 1881, from the population as given by the census of 1881.

|                  | 1881.   | 1891.     | Increase. |
|------------------|---------|-----------|-----------|
| St. Henri        | 6,415   | 13,415    | 7,000     |
| Brantford        | 9,616   | 13,753    | 8,137     |
| Charlottetown    | 11,485  | 11,374    | .....     |
| Hull             | 6,890   | 11,265    | 4,375     |
| Guelph           | 9,890   | 10,539    | 649       |
| St. Thomas       | 8,367   | 10,370    | 2,003     |
| Windsor          | 6,561   | 10,332    | 3,761     |
| Sherbrooke       | 7,227   | 10,140    | 2,853     |
| Belleville       | 9,516   | 9,914     | 398       |
| Peterborough     | 6,812   | 9,717     | 2,905     |
| Stratford        | 8,239   | 9,501     | 1,262     |
| Sie. Cunégonde   | 4,849   | 9,238     | 4,444     |
| St. Catharines   | 9,631   | 9,170     | .....     |
| Chatham, Ont.    | 7,673   | 9,052     | 1,179     |
| Brooklyn         | 7,609   | 7,435     | 1,184     |
| Moncton          | 5,032   | 8,765     | 3,733     |
| Woodstock, Ont.  | 5,373   | 8,612     | 3,239     |
| Trois-Rivières   | 8,670   | 8,334     | .....     |
| Galt             | 5,187   | 7,535     | 2,348     |
| Owen Sound       | 4,426   | 7,497     | 3,071     |
| Berlin           | 4,054   | 7,435     | 3,371     |
| Lévis            | 7,597   | 7,301     | .....     |
| St. Hyacinthe    | 5,521   | 7,016     | 1,695     |
| Cornwall         | 4,468   | 6,805     | 2,337     |
| Sarnia           | 3,874   | 6,693     | 2,819     |
| Sorel            | 5,791   | 6,669     | 878       |
| New Westminster  | 1,590   | 6,641     | 5,141     |
| Fredericton      | 6,213   | 6,502     | 284       |
| Dartmouth, N. S. | 3,786   | 6,249     | 2,463     |
| Yarmouth, N. S.  | 3,485   | 6,089     | 2,604     |
| Lindsay          | 5,080   | 6,081     | 1,001     |
| Barrie           | 4,854   | 5,550     | 696       |
| Weyburn          | 3,906   | 5,516     | 1,610     |
| Truro            | 3,461   | 5,102     | 1,641     |
| Port Hope        | 5,331   | 5,042     | .....     |
| Total            | 731,510 | 1,030,250 | 298,740   |

## POPULATION OF TOWNS FROM 3,000 TO 5,000.

|                    | 1881.   | 1891.   | Increase. |
|--------------------|---------|---------|-----------|
| Collingwood        | 4,445   | 4,940   | 495       |
| Cobourg            | 4,957   | 4,839   | .....     |
| Springhill         | 900     | 4,813   | 3,913     |
| Orillia            | 2,911   | 4,752   | 1,841     |
| St. Jean           | 4,314   | 4,772   | 458       |
| Nanaimo            | 1,845   | 4,595   | 2,750     |
| Carleton           | 1,975   | 4,455   | 2,460     |
| Pembroke           | 2,820   | 4,401   | 1,581     |
| Trenton            | 3,042   | 4,364   | 1,322     |
| Petrolia           | 3,465   | 4,357   | 892       |
| Ingersoll          | 4,318   | 4,191   | .....     |
| Fraserville        | 2,291   | 4,175   | 1,884     |
| Oshawa             | 3,992   | 4,066   | 74        |
| Lunenburg          | 1,750   | 4,044   | 2,294     |
| Calgary            | .....   | 3,876   | 3,876     |
| Smith's Falls      | 2,087   | 3,864   | 1,777     |
| Goderich           | 4,564   | 3,839   | .....     |
| New Glasgow        | 2,595   | 3,777   | 1,182     |
| Amherst            | 2,274   | 3,761   | 1,507     |
| Brandon            | .....   | 3,778   | 3,778     |
| Lachine            | 2,406   | 3,761   | 1,355     |
| Gananoque          | 2,371   | 3,669   | 798       |
| Lauzon             | 3,556   | 3,551   | .....     |
| St. Denis          | 3,709   | 3,546   | .....     |
| Mill End Village   | 1,537   | 3,537   | 3,000     |
| St. Mary's         | 3,415   | 3,416   | 1         |
| Napanee            | 3,680   | 3,434   | .....     |
| Joliette           | 3,268   | 3,347   | 79        |
| Bowmanville        | 3,504   | 3,377   | .....     |
| Portage la Prairie | .....   | 3,363   | 3,363     |
| Niagara Falls      | 2,847   | 3,349   | 1,093     |
| Deseronto          | 1,670   | 3,338   | 1,668     |
| Arnprior           | 2,147   | 3,341   | 1,194     |
| Strathroy          | 3,317   | 3,316   | .....     |
| Woodstock, N. B.   | 2,487   | 3,290   | 803       |
| Pictou             | 2,975   | 3,287   | 312       |
| Brampton           | 2,920   | 3,252   | 332       |
| Perth              | 2,467   | 3,196   | 669       |
| Paris              | 3,173   | 3,094   | .....     |
| Coaticook          | 2,682   | 3,086   | 404       |
| Cote St. Antoine   | 884     | 3,075   | 2,192     |
| Almonte            | 2,684   | 3,071   | 387       |
| Walkerton          | 2,604   | 3,061   | 457       |
| Total              | 115,148 | 162,347 | 47,199    |

## POPULATION OF VILLAGES FROM 1,500 TO 3,000.

|                          | 1881.   | 1891.   | Increase. |
|--------------------------|---------|---------|-----------|
| Pictou.....              | 3,403   | 2,999   | .....     |
| Côte St. Louis.....      | 1,671   | 2,972   | 1,401     |
| Orangeville.....         | 2,947   | 2,962   | 15        |
| Waterloo.....            | 2,066   | 2,941   | 875       |
| Prescott.....            | 2,999   | 2,919   | .....     |
| St. Jérôme.....          | 2,032   | 2,868   | 836       |
| Farnham.....             | 1,880   | 2,822   | 942       |
| Witby.....               | 2,140   | 2,786   | .....     |
| Longueuil.....           | 2,355   | 2,757   | 402       |
| Wallaceburg.....         | 1,525   | 2,736   | 1,201     |
| Port Arthur.....         | 1,275   | 2,698   | 1,423     |
| St. Stephens.....        | 2,338   | 2,680   | 342       |
| Simcoe.....              | 2,645   | 2,674   | 29        |
| Seaford.....             | 2,480   | 2,641   | 161       |
| Clinton.....             | 2,806   | 2,635   | .....     |
| Kincardine.....          | 2,876   | 2,631   | .....     |
| Renfrew.....             | 1,605   | 2,611   | 1,006     |
| Listowel.....            | 2,688   | 2,587   | .....     |
| Nicolet.....             | 1,880   | 2,518   | 638       |
| North Sydney.....        | 1,520   | 2,513   | 993       |
| Sydney.....              | 1,480   | 2,436   | 946       |
| Thorold.....             | 2,456   | 2,373   | .....     |
| Campbellford.....        | 1,418   | 2,424   | 1,006     |
| Notre Dame de Grâce..... | 1,524   | 2,305   | 781       |
| Amherstburg.....         | 2,672   | 2,279   | .....     |
| Chicoutimi.....          | 1,985   | 2,277   | 342       |
| Ridgeway.....            | 1,538   | 2,254   | 716       |
| Buckingham.....          | 1,479   | 2,239   | 760       |
| Mount Forest.....        | 2,170   | 2,214   | 44        |
| Aylmer, Ont.....         | 1,540   | 2,187   | 627       |
| Wingham.....             | 1,918   | 2,167   | 249       |
| Milltown, N. B.....      | 1,664   | 2,146   | 482       |
| Tilsonburg.....          | 1,939   | 2,163   | 224       |
| Newmarket.....           | 2,006   | 2,143   | 137       |
| Penetanguishene.....     | 1,089   | 2,110   | 1,021     |
| Mitchell.....            | 2,284   | 2,101   | .....     |
| Magog.....               | 768     | 2,100   | 1,332     |
| Midland.....             | 1,095   | 2,088   | 993       |
| Dresden.....             | 1,979   | 2,058   | 79        |
| Forest.....              | 1,614   | 2,057   | 443       |
| Richmond, Que.....       | 1,571   | 2,056   | 485       |
| Hawkesbury.....          | 1,920   | 2,042   | 122       |
| Welland.....             | 1,870   | 2,035   | 165       |
| Uxbridge.....            | 1,824   | 2,023   | 199       |
| Palmerston.....          | 1,828   | 2,007   | 179       |
| Meaford.....             | 1,866   | 1,999   | 133       |
| Warton.....              | 796     | 1,984   | 1,188     |
| Portsmouth.....          | 1,734   | 1,974   | 240       |
| Drummondville.....       | 940     | 1,955   | 1,055     |
| Aylmer, Que.....         | 1,762   | 1,945   | 183       |
| London, West.....        | 1,601   | 1,915   | 314       |
| Leamington.....          | 1,411   | 1,910   | 499       |
| Parrsboro'.....          | 1,206   | 1,909   | 703       |
| Point Edward.....        | 1,293   | 1,892   | 589       |
| Gravenhurst.....         | 1,015   | 1,848   | 833       |
| Preston.....             | 1,419   | 1,843   | 424       |
| Oakville.....            | 1,710   | 1,825   | 115       |
| Meriton.....             | 1,798   | 1,818   | 15        |
| Exeter.....              | 1,725   | 1,809   | 84        |
| Lachute.....             | 765     | 1,751   | 986       |
| Dunville.....            | 1,808   | 1,776   | .....     |
| Aurora.....              | 1,540   | 1,743   | 203       |
| Louisville.....          | 1,381   | 1,740   | 359       |
| Waterloo.....            | 1,617   | 1,733   | 116       |
| Iberville.....           | 1,847   | 1,719   | .....     |
| Essex Centre.....        | 800     | 1,709   | 909       |
| Granby.....              | 1,040   | 1,710   | 670       |
| Blenheim.....            | 1,212   | 1,708   | 496       |
| Port Perry.....          | 1,900   | 1,698   | .....     |
| Montmagny.....           | 1,738   | 1,697   | .....     |
| Kentville, N. S.....     | 1,285   | 1,686   | 401       |
| Parkhill.....            | 1,539   | 1,680   | 141       |
| Ashburnham.....          | 1,266   | 1,674   | 408       |
| Harrison.....            | 1,772   | 1,687   | .....     |
| Port Elgin.....          | 1,400   | 1,659   | 259       |
| Alexandria.....          | 1,200   | 1,614   | 414       |
| Fergus.....              | 1,733   | 1,599   | .....     |
| Windsor Mills.....       | 879     | 1,591   | 712       |
| Beauharnois.....         | 1,499   | 1,590   | 91        |
| Bedford.....             | 1,080   | 1,571   | 491       |
| St. Boniface.....        | 1,283   | 1,553   | 270       |
| Berthier.....            | 2,156   | 1,587   | .....     |
| Georgetown.....          | 1,473   | 1,509   | 36        |
| Total.....               | 143,661 | 175,639 | 31,978    |

## CENSUS BY PROVINCES AND ELECTORAL DIVISIONS.

The accompanying, with the exception of Nipissing and the Unorganized Territories, is a statement of the population of Canada by electoral districts.

The figures in the column of 1881 for the Provinces of Ontario and Manitoba differ in many districts from those which appear in the Census volumes of 1881, owing to the changes of boundary which were made by the Redistribution Act and the additions of territory. In every district in which the population of 1891 is compared with that of 1881 the circumscription is the same.

## BRITISH COLUMBIA.

| Districts.           | 1881   | 1891    |
|----------------------|--------|---------|
| Cariboo.....         | 7,550  | *10,000 |
| New Westminster..... | 15,417 | *34,000 |
| Vancouver.....       | 9,991  | 18,229  |
| Victoria.....        | 7,801  | 18,538  |
| Yale.....            | 9,200  | *12,000 |

\* Partial estimated.

## MANITOBA.

| Districts.      | 1881   | 1891   |
|-----------------|--------|--------|
| Lisgar.....     | 12,679 | 22,105 |
| Marquette.....  | 15,449 | 36,068 |
| Provencher..... | 12,496 | 15,469 |
| Selkirk.....    | 13,651 | 55,138 |
| Winnipeg.....   | 7,985  | 25,642 |

## NEW BRUNSWICK.

| Districts.             | 1881   | 1891   |
|------------------------|--------|--------|
| Albert.....            | 12,329 | 10,971 |
| Carleton.....          | 23,965 | 22,523 |
| Charlotte.....         | 26,087 | 23,751 |
| Gloucester.....        | 21,614 | 24,901 |
| Kent.....              | 22,618 | 23,355 |
| King's.....            | 25,617 | 23,094 |
| Northumberland.....    | 25,109 | 25,715 |
| Queen's.....           | 14,017 | 12,152 |
| Restigouche.....       | 7,058  | 6,311  |
| St. John (City).....   | 26,127 | 24,134 |
| St. John (County)..... | 26,839 | 25,390 |
| Sunbury.....           | 6,651  | 6,763  |
| Victoria.....          | 15,686 | 18,218 |
| Westmoreland.....      | 37,719 | 41,484 |
| York.....              | 30,397 | 30,979 |

## NOVA SCOTIA.

| Districts.            | 1881   | 1891   |
|-----------------------|--------|--------|
| Annapolis.....        | 20,598 | 19,352 |
| Antigonish.....       | 18,060 | 16,117 |
| Cape Breton.....      | 31,258 | 34,228 |
| Colchester.....       | 26,720 | 27,160 |
| Cumberland.....       | 27,368 | 34,529 |
| Digby.....            | 19,881 | 19,896 |
| Guysborough.....      | 17,808 | 17,198 |
| Halifax (City).....   | 36,100 | 38,556 |
| Halifax (County)..... | 31,817 | 32,865 |
| Hants.....            | 28,359 | 22,153 |
| Inverness.....        | 25,651 | 25,781 |
| King's.....           | 23,469 | 22,493 |
| Lunenburg.....        | 28,538 | 31,077 |
| Pictou.....           | 35,535 | 34,550 |
| Queen's.....          | 10,577 | 10,610 |
| Richmond.....         | 15,121 | 14,400 |
| Shelburne.....        | 14,913 | 14,956 |
| Victoria.....         | 12,470 | 12,390 |
| Yarmouth.....         | 21,284 | 22,318 |

## ONTARIO.

| Districts.        | 1881   | 1891   |
|-------------------|--------|--------|
| Addington.....    | 23,470 | 24,151 |
| Algoma.....       | 24,014 | 40,656 |
| Bothwell.....     | 22,477 | 25,696 |
| Brant, North..... | 17,645 | 16,993 |
| Brant, South..... | 20,482 | 23,359 |
| Brockville.....   | 15,107 | 15,855 |
| Bruce, East.....  | 22,355 | 21,335 |
| Bruce, North..... | 18,645 | 22,531 |
| Bruce, West.....  | 24,218 | 20,718 |



## ONTARIO.

| Districts.                      | 1881.  | 1891.  |
|---------------------------------|--------|--------|
| Cardwell.....                   | 16,770 | 15,382 |
| Carleton.....                   | 18,777 | 21,749 |
| Cornwall and Stormont.....      | 23,198 | 27,168 |
| Dundas.....                     | 20,598 | 20,132 |
| Durham, East.....               | 18,710 | 17,053 |
| Durham, West.....               | 17,555 | 15,875 |
| Elgin, East.....                | 25,748 | 26,734 |
| Elgin, West.....                | 23,480 | 23,925 |
| Essex, North.....               | 23,659 | 31,523 |
| Essex, South.....               | 21,303 | 24,022 |
| Frontenac.....                  | 14,993 | 13,445 |
| Glengarry.....                  | 22,221 | 22,447 |
| Grenville, South.....           | 13,526 | 12,931 |
| Gray, East.....                 | 25,334 | 26,225 |
| Grey, North.....                | 25,334 | 26,341 |
| Grey, South.....                | 25,708 | 23,072 |
| Haldimand.....                  | 17,680 | 16,318 |
| Halton.....                     | 21,919 | 21,986 |
| Hamilton.....                   | 35,951 | 47,252 |
| Hastings, East.....             | 17,313 | 18,053 |
| Hastings, North.....            | 20,479 | 22,213 |
| Hastings, West.....             | 17,400 | 18,968 |
| Huron, East.....                | 18,962 | 18,962 |
| Huron, South.....               | 21,991 | 19,184 |
| Huron, West.....                | 23,512 | 20,020 |
| Kent.....                       | 29,194 | 31,434 |
| Kingston.....                   | 14,091 | 19,264 |
| Lambton, East.....              | 21,725 | 24,269 |
| Lambton, West.....              | 20,890 | 23,448 |
| Lanark, North.....              | 19,855 | 19,255 |
| Lanark, South.....              | 17,945 | 19,864 |
| Leeds and Grenville, North..... | 12,423 | 13,523 |
| Leeds, South.....               | 22,206 | 22,451 |
| Lennox.....                     | 16,314 | 14,902 |
| Lincoln and Niagara.....        | 25,300 | 21,806 |
| London.....                     | 19,746 | 22,281 |
| Middlesex, East.....            | 25,107 | 26,569 |
| Middlesex, North.....           | 21,288 | 19,095 |
| Middlesex, South.....           | 18,888 | 18,806 |
| Middlesex, West.....            | 19,491 | 17,288 |
| Monck.....                      | 15,940 | 15,316 |
| Muskoka and Parry Sound.....    | 17,686 | 26,515 |
| Nipissing.....                  | 15,059 | 15,059 |
| Norfolk, North.....             | 20,933 | 19,400 |
| Norfolk, South.....             | 19,019 | 17,780 |
| Northumberland, East.....       | 22,991 | 22,001 |
| Northumberland, West.....       | 15,994 | 14,947 |
| Ontario, North.....             | 21,251 | 21,380 |
| Ontario, South.....             | 20,244 | 18,371 |
| Ontario, West.....              | 20,189 | 18,792 |
| Ottawa, City.....               | 27,412 | 37,281 |
| Oxford, North.....              | 24,390 | 26,131 |
| Oxford, South.....              | 24,778 | 22,421 |
| Peel.....                       | 15,387 | 15,472 |
| Perth, North.....               | 26,538 | 26,908 |
| Perth, South.....               | 21,608 | 19,402 |
| Peterborough, East.....         | 20,402 | 21,920 |
| Peterborough, West.....         | 13,310 | 15,803 |
| Prescott.....                   | 22,837 | 24,173 |
| Prince Edward.....              | 21,044 | 18,489 |
| Renfrew, North.....             | 19,124 | 22,719 |
| Renfrew, South.....             | 19,042 | 23,972 |
| Russell.....                    | 25,082 | 31,643 |
| Simcoe, East.....               | 27,185 | 35,801 |
| Simcoe, North.....              | 26,120 | 28,206 |
| Simcoe, South.....              | 22,721 | 20,827 |
| Toronto, Centre.....            | 22,983 | 26,632 |
| Toronto, East.....              | 24,867 | 43,564 |
| Toronto, West.....              | 38,565 | 73,832 |
| Victoria, North.....            | 16,661 | 16,849 |
| Victoria, South.....            | 20,813 | 20,455 |
| Waterloo, North.....            | 20,986 | 25,325 |
| Waterloo, South.....            | 21,754 | 25,143 |
| Welland.....                    | 26,152 | 25,131 |
| Wellington, Center.....         | 26,815 | 33,396 |
| Wellington, North.....          | 26,024 | 24,968 |
| Wellington, South.....          | 25,400 | 24,878 |
| Wentworth, North.....           | 15,998 | 14,591 |
| Wentworth, South.....           | 15,539 | 16,770 |
| York, East.....                 | 29,853 | 35,152 |
| York, North.....                | 21,730 | 20,284 |
| York, West.....                 | 18,884 | 41,263 |

## PRINCE EDWARD ISLAND.

|              |        |        |
|--------------|--------|--------|
| King's.....  | 26,423 | 26,634 |
| Prince.....  | 34,347 | 36,471 |
| Queen's..... | 43,111 | 45,983 |

## QUEBEC.

| Districts.                   | 1881.  | 1891.    |
|------------------------------|--------|----------|
| Argenteuil.....              | 14,947 | 15,168   |
| Bago.....                    | 21,199 | 21,696   |
| Beauce.....                  | 32,020 | 37,221   |
| Beauharnois.....             | 16,405 | 16,666   |
| Bellechasse.....             | 16,914 | 18,369   |
| Berthier.....                | 21,838 | 19,839   |
| Bonaventure.....             | 18,908 | 20,834   |
| Brome.....                   | 15,827 | 14,711   |
| Chamblay.....                | 10,858 | 11,704   |
| Champlain.....               | 26,818 | 28,008   |
| Charlevoix.....              | 17,901 | 19,037   |
| Chateauguay.....             | 14,933 | 18,865   |
| Chicoutimi and Saguenay..... | 32,409 | * 38,000 |
| Compton.....                 | 19,581 | 22,782   |
| Doux-Montagnes.....          | 16,894 | 15,027   |
| Dorchester.....              | 18,710 | 19,042   |
| Drummond and Arthabaska..... | 37,860 | 43,927   |
| Gaspé.....                   | 25,001 | * 27,500 |
| Hochelaga.....               | 40,079 | 81,011   |
| Huntingdon.....              | 15,495 | 14,385   |
| Jerville.....                | 14,459 | 11,895   |
| Jacques Cartier.....         | 12,945 | 13,832   |
| Joliette.....                | 21,988 | 22,898   |
| Kamouraska.....              | 22,181 | 20,455   |
| Laprairie.....               | 11,436 | 10,898   |
| L'Assomption.....            | 15,282 | 13,744   |
| Laval.....                   | 9,462  | 9,434    |
| Lévis.....                   | 27,980 | 26,995   |
| L'Islet.....                 | 14,917 | 13,233   |
| Lothbinière.....             | 20,857 | 20,669   |
| Maskinongé.....              | 17,493 | 17,880   |
| Mégantic.....                | 19,056 | 22,233   |
| Missisquoi.....              | 17,784 | 18,549   |
| Montcalm.....                | 12,966 | 12,131   |
| Montmagny.....               | 16,422 | 14,724   |
| Montmorency.....             | 12,322 | 12,311   |
| Montreal Centre.....         | 25,078 | 28,122   |
| Do. East.....                | 67,506 | 92,079   |
| Do. West.....                | 48,163 | 62,494   |
| Napierville.....             | 10,511 | 10,102   |
| Nicolet.....                 | 26,611 | 28,743   |
| Ottawa County.....           | 62,643 | 62,643   |
| Pontiac.....                 | 19,989 | 21,851   |
| Portneuf.....                | 25,175 | 25,814   |
| Quebec City, Centre.....     | 17,898 | 17,649   |
| Do. East.....                | 81,900 | 86,200   |
| Do. West.....                | 12,648 | 9,241    |
| Quebec County.....           | 20,378 | 19,504   |
| Richelieu.....               | 20,218 | 21,334   |
| Richmond and Wolfe.....      | 26,339 | 31,351   |
| Rimouski.....                | 33,791 | 33,436   |
| Rouville.....                | 18,547 | 16,019   |
| St. Hyacinthe.....           | 20,630 | 21,433   |
| St. Jean.....                | 12,262 | 12,982   |
| St. Maurice.....             | 12,886 | 13,142   |
| Shefford.....                | 23,233 | 23,263   |
| Sherbrooke.....              | 12,221 | 16,104   |
| Soulanges.....               | 10,320 | 9,612    |
| Stanstead.....               | 15,556 | 18,072   |
| Terrebonne.....              | 25,484 | 25,704   |
| Trois-Rivières.....          | 22,959 | 23,128   |
| Vaudreuil.....               | 9,236  | 8,834    |
| Verchères.....               | 11,485 | 10,803   |
| Yamaska.....                 | 12,449 | 12,257   |
|                              | 17,091 | 16,058   |

\* Partly estimated.

## THE TERRITORIES.

|                   |        |   |         |
|-------------------|--------|---|---------|
| Alberta.....      | 25,515 | { | *20,056 |
| Assiniboia.....   |        |   | 20,282  |
| Do. West.....     |        |   | *10,003 |
| Saskatchewan..... | 30,981 | { | 11,146  |
| Unorganized.....  |        |   | +32,168 |

\* Partly estimated. † Wholly estimated.

Complete returns from the district of Alberta give its population at 26,123 instead of 20,056, as contained in the partially estimated statement furnished to Parliament on Aug. 27, 1891. The increase of population, therefore, for the provisional districts in the Northwest Territories, from the returns so far received, is 42,039, instead of 35,972. The percentage of increase is 164.76, instead of 140.98, and the total numerical increase for the whole Dominion is 504,601, instead of 498,534, the percentage of total increase being 11.66, instead of 11.53.

**CANAJOHARIE**, a village of New York, situated on the south bank of the Mohawk, opposite Palatine bridge, 55 miles west of Albany. It is the seat of an academy, and contains manufactories of paper bags, malt, and lumber.

**CANAL DOVER**, a village of Ohio, situated on the Tuscarawas River, about a hundred miles north of Marietta. It contains manufactories of iron, flour, and leather.

**CANASTOTA**, a village of New York, about 30 miles west of Utica. It is the seat of an academy and of a high school, and contains manufactories of cutlery, astronomical instruments, and salt. Mineral springs occur within the town.

**CANBY**, EDWARD RICHARD SPRIGG, soldier, born in Kentucky in 1817, killed in Siskiyou county, Cal., April 11, 1873. He graduated in the class of 1839 from the U. S. Military School. He served with distinction in the Mexican war, as well as the war of the rebellion, receiving the full rank of brigadier-general in 1866. During the winter of 1872-73 he was engaged in making terms with the Modocs, and was treacherously shot while conferring with them regarding a treaty of peace.

**CANISTEO**, a village of New York, situated on the Canistota River, 55 miles west of Elmira. It contains manufactories of flour, leather, chairs and lumber, and is the seat of an academy.

**CANNELTON**, a village of Indiana, county-seat of Perry county, situated on the Ohio River, 70 miles above Evansville. It is an important coaling station for steamboats, and manufactures cotton goods, flour, pottery, chairs, paper, lumber and drain-tiles.

**CANON CITY**, a village of Colorado, county-seat of Fremont county, situated in a rich mining district, below the Grand Cañon of the Arkansas. It is the seat of an academy, and of the Colorado penitentiary. It is a favorite health resort, having several medicinal springs. The surrounding country is rich in copper, silver, coal, iron, marble, limestone and oil.

**CANTON**, a city of Ohio, and county-seat of Stark county (see Britannica, Vol. V, p. 39). Canton is the seat of extensive manufactories, including the works of the Wrought Iron Bridge Company, and Agricultural Machine Works. It is situated in a rich agricultural district, which furnishes wheat, corn and oats for export. Coal is also an article of export. Its population has increased from 12,258 in 1880 to 26,327 in 1890.

**CANTON**, a city of Illinois, about 25 miles west of Peoria. It contains important coal mines, an extensive meat-packing establishment, and important manufactories of iron, agricultural implements, wagons and cigars.

**CANTON**, a town of Massachusetts, situated on the Neponset River, fourteen miles south of Boston. Within the township are extensive manufactories of machinery, sewing silk and cotton and woolen goods. Population in 1890, 4,538.

**CANTON**, Missouri, the county-seat of Lewis county, an important shipping station for the surrounding country, being conveniently situated on a railroad and on the Mississippi River. Christian University is here located.

**CANTON**, a manufacturing town, county-seat of St. Lawrence county, N. Y., situated on Grass River and on the Rome, Watertown and Ogdensburg Railroad. Canton Academy and the St. Lawrence University are two of the institutions here located.

**CANTON**, a town of South Dakota, county-seat of Lincoln county, situated on the Sioux River, about seventy miles north of Sioux City. It is the seat of Normanna College. It has water-power, and extensive manufactories. Population in 1890, 1,642.

**CANTON**, a post village in Bradford county, Pa., located on the railroad and having in 1890 a population of 1,393; township, 1,885.

**CANTON**, in geography, a division of territory, constituting a separate government or state, as in Switzerland. In France a canton is a subdivision of an arrondissement.

**CANTON'S PHOSPHORUS**, or **PYROPHORUS**, is obtained by heating in a close vessel three parts oyster-shells and one part sublimed sulphur, when the sulphuret of calcium is formed, which takes fire when exposed to or thrown into the air.

**CANTU**, CESARE, an Italian author, born at Brivio in 1807, educated at Sondrio, where he was appointed professor of belles-lettres. Having been imprisoned in 1833 for the offense of expressing liberal tendencies in a historical work on Lombardy, he spent his leisure hours in describing the sorrows of a prisoner in the form of an historical romance, *Margherita Pusterla*. His great work, *Storia Universale* (35 vols., 1836-42), has been followed by many others on history and literature, as well as by some of a lighter character.

**CANUN**, a Turkish musical instrument, strung with gut-strings. It is thrummed with the fingers, on which are thimbles of tortoise-shell pointed with pieces of cocoa-nut, forming plectra for striking the strings.

**CANVAS-BACK DUCK** (*Fuligula vallisneria*), a North American duck highly esteemed for the delicacy of its flesh. See **POCHARD**, Britannica, Vol. XIX, p. 252.

**CAP**, in ship-building, a strong, thick block of wood fixed near the top of the mast. It has a hole to receive the upper end of the lower mast, and another to receive the lower end of the topmast with eyebolts to aid in hoisting the topmast. There is also a cap of smaller size at the point of junction between the topmast and the top-gallant-mast. When made of iron, the cap is called a "crance."

**CAPACITY**, **LEGAL**, the power to alter one's rights or duties by the exercise of free-will, or responsibility to punishment for one's acts. Civil capacity depends on age and mental condition. But civil incapacity is often imposed as a punishment on persons of full age and undoubted mental capacity. Convicts and persons attainted are placed under a general civil incapacity, and partial incapacities are also imposed as punishments. The disabilities attaching to married women have been largely removed by recent legislation both in Great Britain and in the United States. For supposed political reasons aliens were for a long time debarred from ordinary civil rights, and they are still properly excluded from political rights until they are naturalized and adopt the obligations of a citizen. Different tests of capacity are applied to different transactions, as in contracts and testaments.

**CAP-A-PIE**, a term applied, in the military language of the Middle Ages, to a knight or soldier armed from head to foot, with armor for defense and weapons for attack.

**CAPARISONED**, dressed in caparisons. A war-horse completely furnished for the field is said to be caparisoned.

**CAPE ANN**, the eastern point of Essex county, Mass. Valuable quarries of syenite are here opened on a rocky headland. On Thatcher's Island, the most northern limit of Massachusetts Bay, are two stone light-houses.

**CAPE CANAVERAL**, a point of land on the eastern coast of Florida, on which there is a tall light-house for warning seamen off the dangerous shoals that surround the cape.

**CAPE CHARLES**, the southern point of the "Eastern Shore" peninsula which separates the



Atlantic from Chesapeake Bay. Near the cape, on Smith's Island, is a light-house.

CAPE COD, properly a narrow peninsula of Massachusetts, in form somewhat like the letter L. It is 65 miles in length, and forms the southeast boundary of Cape Cod Bay. The northern extremity is marked by a revolving light, 155 feet above the sea.

CAPE ELIZABETH, a summer resort of Maine and a suburb of Portland. It has a State reform school, important manufactories and a dry-dock.

CAPE FAREWELL, the most southern point of Greenland.

CAPE FEAR, the southern point of Smith's Island, North Carolina, on the Atlantic Ocean.

CAPE FEAR RIVER, a river formed by the junction of the Haw and Deep Rivers at Haywood, Chatham county, N. C. It flows southeast, and enters the Atlantic near Cape Fear. Including its branches it has a length of 200 miles, 120 of which are navigable.

CAPE FLATTERY, the most westerly point of the United States outside Alaska. It is situated on the northwestern coast of Washington.

CAPE FLORIDA, the south point of Key Biscayne, 390 miles southeast of St. Augustine.

CAPE FOULWEATHER, or YAQUINA HEAD, the western point of Oregon, in Tullamook county. It has a brick light-house.

CAPE GIRARDEAU, a city of Girardeau county, Mo. It has a normal school, a female academy and St. Vincent's College. It exports cotton, and among its manufactures are plows and mineral paints.

CAPE HATTERAS, the eastern point of North Carolina. It is a long, low, sandy bank separated from the main land by Pamlico Sound. Navigation along the coast is very dangerous, and a light-house 190 feet high has here been erected.

CAPE HENLOPEN, the point of land on the east coast of Delaware, at the entrance to Delaware Bay, opposite Cape May. It has a stone light-house.

CAPE HENRY, a cape opposite Cape Charles, at the entrance to Chesapeake Bay, in Virginia. It has a light-house.

CAPE HORN, a dangerous, rocky, dismal island, the extreme southern point of America.

CAPEL, THOMAS JOHN, MONSIGNORE, an eminent English Roman Catholic prelate, born at Brompton in 1836. He is the founder of several educational and ecclesiastical institutions. He lectured in the United States in 1883.

CAPE LA HAGUE, a promontory of France, forming the northwest extremity of the peninsula of Cotentin in the department of Manche. It juts into the English Channel opposite the Island of Alderney.

CAPE LA HOGUE, often confounded with Cape la Hague, and situated on the east side of the same peninsula. Here the French were defeated by the united English and Dutch fleets in 1692.

CAPE OF GOOD HOPE (Cape Colony). See Britannica, Vol. V, pp. 41-50. The latest official returns up to 1891 give the area of the whole colony as 213,636 square miles, with a population of 1,250,000. The capital, Cape Town, has a population of 60,000; Port Elizabeth, the chief commercial port, has 18,000; Grahamstown, the capital of the eastern province, 10,000; Kimberly, the seat of the diamond trade, 25,000. Whites number about a third of the entire population, and the greater number of them are of Dutch descent. The number of registered electors in 1890 was 73,916. The right of suffrage is limited to occupiers of property worth \$250, or receiving \$250 salary, or \$125 salary with board and lodging. There is a university at Cape

Town (Royal Charter, 1877), and there are a large number of state-aided elementary schools, besides private and religious institutions. For defense there is a force of Cape Mounted Rifles, 769; Volunteers, 4,000; and every able-bodied man between 18 and 50 is liable to be called out for military service. There are 1,693 miles of railway in operation, which is government property. There are 8,981 miles of telegraph wires in operation. About 84,000,000 acres are in occupation, of which 600,000 are under cultivation. Vineyards occupy 20,000 acres, producing 4,500,000 gallons of wine, and 1,000,000 gallons of brandy. Ostriches number 25,000; sheep, 11,000,000; cattle, 1,112,000; goats, 3,000,000. The wheat crop of 1890 amounted to about 1,700,000 bushels, other grain 3,000,000 bushels, tobacco 3,000,000 pounds, aloes 340,000 pounds, and dried fruit 2,500,000 pounds. Cotton and rice are grown in limited quantities. The principal exports are wool, Angora hair, ostrich feathers, sheep and goat-skins, diamonds, wines, spirits, copper ore and aloes. The exports of wool in 1890 amounted to \$7,903,045, and diamonds over \$20,000,000. The colony has been gradually enlarged by annexations, the latest of which are Griqualand West, annexed in 1880; the various Transkeian territories, 1875-87; and Wal-fisch Bay, 1884.

CAPELIN, or CAPLIN (*Mallotus villosus*), the only species of a genus belonging to the salmon family, and nearly related to the smelt (see Britannica, Vol. XXI, pp. 221-224). It is one of the smallest members of the family, lives on the sea-bottom of the northern coast of the Atlantic, comes to the surface to spawn, and furnishes one of the most important parts of the cod's food in northern regions. Vast shoals occur periodically off Newfoundland. The capelin is much used as bait in the cod fishery; it is eaten fresh in Iceland, and is sometimes imported in dried form into Great Britain. Its flavor is pleasant, and suggests affinity with herring.

CAPELLA, a bright star of the first magnitude, on the left shoulder of the northern constellation of Auriga, in front of the Great Bear, nearly in a line with the two northernmost of the seven stars forming Charles' Wain.

CAPE LOOKOUT, the southeast extremity of the islands adjacent to Carteret county, N. C. Its light-house is 150 feet high.

CAPE MAY, a famous watering place of New Jersey, on an island in the Atlantic, 81 miles by rail from Philadelphia, with which it has daily communication by steamboats during the summer.

CAPE MENDOCINO, a lofty headland, the most western point of California. It has a light-house 423 feet high.

CAPEN, NAHUM, author and publisher, born in Canton, Mass., April 1, 1804, died in Dorchester in 1886. He edited the "Massachusetts State Record" from 1847 to 1851, wrote for the press, published the *Republic of the United States*, and, at the time of his death, had a *History of Democracy* nearly completed. He was among the first to urge the passage of an international copyright bill. The census board at Washington sprang from a letter of his published by the United States Senate. The system of collecting letters from street boxes originated with him while postmaster of Boston (1857-1861).

CAPE NORTH, the most northerly point of Europe, on the Magerø Island, north of Norway.

CAPE OF GOOD HOPE, a lofty promontory, the southern extremity of Africa. It rises 1,000 feet above sea level, and terminates the range of Table Mountains. It was discovered by Bartholomew Diaz in 1486, and first doubled by Vasco de Gama in 1497.

CAPE PRINCE OF WALES, a point in Alaska on Bering Strait, opposite East Cape in Asia. It is the most westerly point of America.

CAPE RACE, the southeastern point of Newfoundland, extending into the Atlantic. It is a dangerous point on account of the dense fogs there prevalent. A light-house 180 feet high has been built, and all vessels sailing between Great Britain and the northeastern part of North America are taxed for its maintenance.

CAPE RIVER, or RIO DE SEGOVIA (properly *Vaunks*, or *Wanx*), a large river of Nicaragua, which, after a generally northeast course of about 300 miles, empties into the Caribbean Sea. It is navigable for a considerable distance from the sea, but the upper part of its course is obstructed by cataracts and shallows.

CAPE SABLE, the southernmost point of Florida.

CA E SAN LUCAS, the southern extremity of Lower California.

CAPE ST. ROQUE, a promontory of Brazil. the most eastern in America, with the exception of Cape St. Augustine.

CAPE ST. VINCENT, the southwestern extremity of Portugal. Near this point the Spanish fleet was defeated by the British navy in 1797.

CAPE TRAFALGAR, a headland of Spain, between Cadiz and Gibraltar, on the Atlantic coast. Near this cape a famous battle was fought, Oct. 21, 1805, between the English and the French and Spanish fleets, in which the English were victorious, but suffered the loss of their commander, Lord Nelson.

CAPE VERD, the most westerly headland in Africa, projecting into the Atlantic Ocean between the rivers Gambia and Senegal, in latitude 14° 43' north, and longitude 17° 34' west. It was discovered by the Portuguese about 1445, and is said to have derived its name from a group of gigantic baobab trees which adorns its summit.

CAPE VINCENT, a summer resort of New York, situated on the St. Lawrence River, opposite Kingston, Ont. Shingles and flour are here manufactured. The place is a port of entry.

CAPIAS. See *Britannica*, Vol. XXIV, pp. 695-96.

CAPILLAIRE, a syrup prepared by adding sugar and orange-flower water to an infusion of the Maidenhair fern, and formerly used as a pectoral in chronic catarrhs; any syrup flavored with orange-flower.

CAPITA, DISTRIBUTION PER, a familiar expression in the law relating to wills and succession. It means that where the persons claiming under a will consist of, for example, three families of grandchildren, the estate or fund is divided equally among all the grandchildren (whatever the size of the family), and not equally among the three families. The opposite principle of division, namely, among families, is called distribution *per stirpes*. Testators frequently fail to make their meaning clear on this point.

CAPITAL. See *Britannica*, Vol. V, p. 71-73.

CAPITAL: in fortification, an imaginary line dividing a defense work into two similar and equal parts.

CAPITAL, in geography, is the principal city or town of a country, where the legislature meets and the chief legal courts are held.

CAPITAL ACCOUNT, a name given to what concerns the capital stock of a railway or other public company. In authorizing a railway company, Parliament, Congress, or State legislatures give power to raise so much money by shares, and so much by borrowing. This money forms the capital of the company, and constitutes the *capital ac-*

*count*. On this fund the directors of the company make drafts to pay for the land, and all the works connected with the line, as also rails, locomotives, carriages, and in short everything involved in perfecting the railway up to the point of working. After the railway is opened all working expenses and renewals of line and plant should be charged to revenue account, but extensions of the line and additional plant should be charged to capital account. The same principle applies to all joint-stock companies. It is of the utmost importance that these two accounts be kept quite distinct.

CAPITAL PUNISHMENT (*Lat., pena capitalis*), a penalty relating to the head, affecting the head, or life, as without the head there can be no life; hence involving the forfeiture of life. All the more serious offenses against society, and frequently very trivial ones, were, in many parts of the world, punishable with death until comparatively recent times. As a penalty for murder it has prevailed from the earliest ages in all parts of the world. In the primitive state of the social organization, at least in the earliest condition of which we have any record, retaliation (*lex talionis*) was the common method of punishment. The right of individual revenge not only existed in the savage state of mankind, but also has been recognized and tolerated for many ages, even after laws had been enacted for the restraint of crime; and not only this, but with very many nations the rule of retaliation became established and recognized in a very large degree. It provided following not only the ancient savage procedure, but also the Mosaic permission, that the punishment should be the same in kind as the crime. Under the Hebrew law it was enacted that punishment should invariably be "an eye for an eye; a tooth for a tooth; a life for a life," and any person belonging to the family of the slain had the legal privilege of pursuing the murderer and taking the customary vengeance. The methods permitted by law for producing death were four: the sword, strangling, fire and stoning. Lest punishment might be too precipitate, or improperly administered, the criminal, especially if he were able to present the plea of justifiable killing, might flee and endeavor to reach one of the established "cities of refuge," where he would at least be temporarily safe.

The Hebrew polity being theocratic, many offenses were punished capitally as violations of the national faith. Among them are to be particularly noted—desecration of the Sabbath; blasphemy, idolatry, witchcraft, cursing, offerings to Moloch; disobedience to parents; murder, adultery; incest and kidnaping a free person. The "avenger of blood" was a person having such a right of carrying out private vengeance that he superseded any public officer who might otherwise have authority in the premises.

The Hebrews undoubtedly adopted this custom from the Egyptians; for when Moses fled the country after he had killed an Egyptian and buried him in the sands to avoid detection, he was after forty years informed that those who sought his life were dead; hence there was no fear in his returning to the land where his people dwelt.

In Greece, under the rule of Draco, a system of laws was prescribed which fixed death for certain offenses, some of them extremely trivial—as stealing from a dwelling-house an amount equivalent to about \$10 of American money. Draco claimed that those guilty of such a crime deserved death. The greater crimes could not be visited by any severer punishment, and therefore above a certain limit, of which the above cited instance is a specimen, death was invariably the penalty. The crimes



ordinarily punished by death, or for which death was prescribed by law, were sacrilege; disrespect for the popular faith; the non-observance of established religious rites; treason; murder, or attempt to murder; and incendiarism. Socrates was accused of spreading disbelief in the national religion, and notwithstanding his eminence as a teacher and a scholar, the ordinary administration of justice demanded his death, and he was condemned to drink poison. Such infamous results of basely conceived laws had a necessary reaction. Modifications were inaugurated, and the Athenian code became eventually very mild.

Among the principal methods of capital punishment crucifixion occupies a prominent place. This peculiar mode is traditionally ascribed to Semiramis, and was practiced by the Egyptians, the Carthaginians, the Persians, the Assyrians, Scythians, Indians, Greeks, Macedonians, ancient Germans, and Romans. Whether it was practiced by the ancient Jews or Hebrews is a matter of dispute.

In Japan, the criminal, especially if he be high in rank, is condemned to take his own life in the presence of officials, by the method known as *hara-kiri*—a peculiar kind of disemboweling process; while in China the victim is usually beheaded.

In the Twelve Tables of ancient Rome, into which the *decemvirs* condensed the laws, there was very great severity, the statutes going so far as to pronounce the penalty of death against writers of libels, etc. The execution of the laws in all their rigor was only prevented by the laws previously passed during the consulate of Valerius Poplicola, and known as the Valerian laws. Crucifixion, one of the popular methods of punishment in the nation in all parts of the Empire, was abolished by Constantine in the latter part of his reign.

In ancient Germany private retaliation was permitted, and continued long after the country became a part of the Roman Empire. In the greater part of modern Germany beheading is the mode of execution adopted. In Austria hanging is the legal method.

Among the Anglo-Saxons associations were often formed by men of the same class for mutual protection, and any member of the society was pledged to pursue a murderer until the full completion of the *lex talionis*.

In the history of England the benefit of clergy was for a long time denied by statutory enactment to those condemned to death—until, indeed, a comparatively recent time. Blackstone enumerates 160 different offenses incurring the death penalty without benefit of clergy, four-fifths of which had been prescribed during the reigns of the first three Georges; but the terrible list was gradually reduced to two—treason and murder. In England, Scotland and Ireland, until within a generation or so, the rack, the gibbet, decapitation, quartering, disemboweling and burning were practiced. Happily, all but the gibbet have been abolished, or have gone into disuse owing to the advancement of civilization.

It is to be noted that in France the guillotine is still used, and in Spain the garrote, which is undoubtedly the quickest and most complete method where capital punishment is required.

The crimes which at various periods have been punishable by death in the United States are treason, murder, arson, piracy, robbery of the mail with jeopardy to the life of the person in charge thereof, rescuing a person convicted of a capital offense when on the way to execution, burning a vessel of war, or destroying a vessel owned by private parties. Treason and murder are punishable

with death in most of the States. Rape, arson and robbery when attended with special villainy are included. Within the United States so-called "witches" were punished by burning at the stake, and this at a period so recent as to produce in the reader a thrill of horror. The stake has been abolished, and hanging remains as capital penalty, only in some of the States. In William Penn's code of laws for Pennsylvania, capital punishment was prescribed for two crimes only—treason and murder. Since that time some of the States have abolished capital punishment, and substituted instead imprisonment for life. In New York in 1888, the condemnation to hanging was superseded by condemnation to "electrocution," or death by electricity.

In the armies of the world, desertion, conviction as a spy, and the act of secretly communicating intelligence to the enemy are all regarded as capital offenses, and punishable by either being shot or hanged—the latter being regarded as the more disgraceful mode of execution.

In many of the navies of the world the culprit, if he be an officer, is shot; if a common seaman he is usually hanged at the yard-arm.

The tendency in the present century has been to limit capital punishment to the greatest crimes only; and the more intelligent the nations become under the influence of Christian civilization, the more prevalent becomes the opinion that it would be well to abolish the death penalty altogether. One great argument in favor of this is that in all ages, our own not excepted, many persons have suffered the death penalty who were afterward found to have been wholly innocent of the crimes imputed to them.

CAPNOMANCY, a divination by smoke practiced by the ancient Greeks. They threw grains of jasmine or poppy on the burning coals, and watched the motions, and density of the smoke that rose from them, or they watched the smoke of sacrifices. If the smoke was thin and ascended in a right line, the augury was good. It was also believed that the inhalation of the smoke gave the priests prophetic powers.

CAPPAGH BROWN, a bituminous earth, which yields pigments of various shades of brown. The coloring matters are oxide of manganese and iron. The cappagh browns are transparent and permanent. The name is derived from Cappagh in Ireland.

CAPPARIDEE, a natural order of exogenous plants, allied to *Cruciferae*, and including about 350 known species, mostly natives of tropical and subtropical countries. Many of the species possess stimulant properties, while some are poisonous. One of the most interesting plants of the order is the *Sirák*, a bush or small tree of Africa, the small berries of which have a pungent taste like pepper. When dried they constitute an important ingredient in the food of the natives, and the roots when burned yield considerable salt.

CAPPEL, a village of Switzerland in the canton of Zurich, 10 miles southwest of the city of that name. Here the reformer Zwingli was killed in a conflict with troops of the Roman Catholic cantons, in 1531. See *Britannica*, Vol. XXIV, p. 838.

CAPRICCIO, in art, a term applied to a picture or other work which designedly violates the ordinary rules of composition. Foliated ornaments, with cupids or other figures appearing in them in situations not strictly natural, are capriccios. In music *capriccio* is a free composition, not conforming to rule as to form or figure. Locatelli, at the beginning of the 18th century, composed capriccios for the violin. The most celebrated capriccio of mod-

ern times is Mendelssohn's B minor capriccio for pianoforte and orchestra.

**CAPRICORNUS**, the *Goat*, a southern constellation and the tenth sign of the zodiac. It is usually represented as having the fore-part of a goat, but the hinder-part of a fish. The ancients regarded it as the harbinger of good fortune, and as marking the southern tropic or winter solstice, wherefore they called it the "Southern Gate of the Sun."

**CAPRIDÆ**, a term used by some naturalists to denote the sheep and goat family, but by others to include antelopes, their persistent horns being regarded as the great distinction between them and the *Cervidæ*, or deer family.

**CAPRIFICATION**, a practice of great antiquity, still followed in some localities, of hanging the branches of the so-called "goat-fig" or caprificus in the cultivated trees, for the purpose of effecting the fertilization of the edible fig. The goat-fig has male flowers, producing pollen, and female flowers, which the eggs of a parasitic insect, *Blastophaga grossorum*, turn into galls. The edible fig-tree has normal female flowers, which are not adapted to become galls. Hence, when the male and insect-containing female flowers of the wild-fig are hung on the edible fig-tree, the gall-insect escaping from the orifice covers itself with pollen, and flying to the normal female fig-flowers fertilizes them, causing the production of the proper figs.

**CAPRIFOLIACÆ**, a natural order of exogenous plants, consisting of shrubs and herbaceous plants, which have opposite leaves without stipules, and flowers disposed in corymbs, in heads or in whorls. The fruit is generally a berry. The order is very nearly related to *Cinchonacæ*. More than 200 species are known, chiefly natives of the temperate and colder regions of the Northern hemisphere. To this order belong the honeysuckle, elder, snow-berry, etc.

**CAPRIMULGIDÆ**, a family of birds of the order *Insectores* and tribe *Fissirostres*, nearly allied to the *Hirundinidæ*, or swallow tribe. They are insectivorous, have very long wings, short legs, and toes united at the base by a membrane. The family includes the whip-poor-will and night-hawk of America, and many other species widely distributed over the globe.

**CAPSALI**, a seaport town of the Ionian Islands, capital of Cerigo, built upon a narrow ridge terminating in a precipitous rock near the south end of the island. It has an excellent harbor. Population, 5,000.

**CAPSICINE**, an alkaloid, the active principle in capsicum or cayenne pepper, from which it is obtained. It is a thick liquid of a reddish color, and possesses strong acrid properties.

**CAPSULE**, in medicine, a word given by French anatomists to parts which bear no analogy to one another. Strictly speaking, a capsule is a small casing, envelope, covering, etc., thin and membranous; a membrane or ligament inclosing some part or organ, as in a bag or sac; a sacular investment, as the capsule of the kidney; the capsule of the crystalline lens of the eye; the capsule of the joint of the hip. The capsule of the kidney is a smooth, fibrous membrane, closely investing the kidney and forming its outer coat; the capsule of the lens is a transparent, elastic, brittle, and structureless membrane inclosing the lens of the eye; the "external capsule" is a layer of white nervous substance between the *claustrum* and the *putamen* of the brain; the "internal capsule" is a layer of nerve-fibers passing upward from the *crura cerebri* to the *cortex* between the *caudate nucleus* and the *optic thalamus* on the one side, and the *lenticular nucleus* on the other. The word has also been ex-

tensively used for a small gelatinous case or envelope, in which nauseous medicines are wont to be inclosed, to aid in their being swallowed. Certain medicines are so offensive to the taste, and consequently so apt to sicken the stomach, that it is highly desirable to administer them in such a way as to prevent their contact with the tongue and palate. This object is fully accomplished by the use of *capsules*. They are made principally of gelatin, and of such thickness that before the nauseating medicine can be dissolved it is swallowed, and its unpleasant taste avoided. In botany a capsule is a dry syncarpous fruit, opening either by valves, as in the *rhododendron*, or by pores near the summit, as seen in the poppy and snap dragon.

**CAPTAIN (MILITARY)**, originally a head or leader, irrespective of the number of men under him, but now the commander of a company, whether of infantry, cavalry, or artillery. In the German army, where the infantry companies consist of 250 men each, the captain is a mounted officer; in the British and United States armies he marches on foot with his men, who look to him for everything, both in barracks and in the field. In cavalry regiments the captain also deals individually with his men when in barracks, but in the field he works under the leader of the squadron of which his troop forms half. The badge of rank in the British army is two stars on each shoulder-strap; in the United States army, two bars.

**CAPTION**: in law, the formal title of an indictment or a deposition, which shows the authority under which it is executed, and such other particulars as are necessary to render it legal and valid. Prior to 1837 caption was the name given in Scotland to the formal warrant to apprehend a debtor or other defaulting obligant, which was given in the bill chamber after letters of horning had been executed.

**CAPTURE**. See *CONTRABAND*, *Britannica*, Vol. VI, pp. 320-322.

**CAPUCHIN MONKEY**, a name given to several species of the genus *Cebus*, of South American monkeys, which have the head covered with short hair, so disposed as to resemble the cowl of a capuchin, the face being almost naked, or only covered with a little down.

**CAPUCHINS**. See *Britannica*, Vol. V, pp. 79, 80.

**CAPUDAN-PASHA**, the High Admiral of Turkey. He has the entire command of the navy, and the management of all naval affairs. The port of Pera, contiguous to the arsenal, the Turkish island in the archipelago, and a number of seaports and maritime districts are under him, even in their civil administration.

**CAPULETS** and **MONTAGUES**, the English spelling of the names of the Cappelletti and Montecchi, two noble families of Northern Italy, according to tradition of Verona, chiefly memorable from their connection with the legend on which Shakespeare has founded his tragedy of *Romeo and Juliet*. They both belonged to the Ghibelline faction, as we see from a reference in canto VI of Dante's *Purgatorio*. The first publication in which the essential incidents of Shakespeare's play appear is a novel by Luigi da Porto, printed at Venice in 1535. There is evidence that an English play founded on the same incidents appeared soon after, and that before Shakespeare's time the story was so well known in England that it had supplied subjects for tapestries.

**CAPUT MORTUUM VITRIOLI**, the name given by the alchemists to the red powder which remains in the retorts when green vitriol or the sulphate of iron is calcined.

**CAPYBARA**. See *Britannica*, Vol. V, p. 80.



**CARACARA EAGLE**, a genus of birds of prey, natives of America, regarded as a connecting link between eagles and vultures; agreeing with the former in their strong hooked bill and claws, and with the latter in their naked face and propensity to prey on carrion.

**CARACCA**, LA, a village of Andalusia, Spain, one of the chief naval arsenals of the kingdom, situated four miles southeast of Cadiz. It has been completely detached from the main land by artificial means; it is defended by four forts, and is altogether very complete as an arsenal. See CADIZ, Britannica, Vol. IV, p. 627.

**CARABIDÆ**, a tribe of beetles, or coleopterous insects, of the section *Pentamera*. See COLEOPTERA, Britannica, Vol. VI, p. 129.

**CARACCIOLI**, PRINCE FRANCESCO (1748-99), born in 1752 of a noble Neapolitan family. He had risen to the supreme command of King Ferdinand's navy, when, in December, 1798, he fled with him before the French from Naples to Palermo. Learning, however, of the intended confiscation of the estates of all absentees, he obtained permission to return to Naples, where he entered the service of the "Parthenopean Republic," and was placed at the head of its marine. For two months he ably directed the operations of the revolutionists, and not until their cause seemed hopeless, though before the capitulation, did he quit the capital. He was captured in peasant disguise, and June 29, 1799, was brought on board Nelson's flagship, tried by a court-martial of Neapolitan officers, and hanged from the yard-arm of a Neapolitan frigate.

**CARADOC SANDSTONE**, and **BALA BEDS**, a division of the Lower Silurian system developed in Shropshire, England. They consist of sandstones, grits, and slates, with occasional beds of limestone. See Britannica, Vol. X, p. 332, for a full account of the numerous fossils obtained from this formation.

**CARAFFA**, the name of an ancient and famous Neapolitan family, to which several cardinals and Pope Paul IV belonged. Carlo Caraffa, nephew of Paul IV, was born in 1517, fought in the Netherlands, joined the Knights of Malta, and was made cardinal by his uncle. Paul subsequently banished the cardinal and his brothers from Rome for extortion, and in 1561 Pope Pius IV caused him to be put to death.

**CARAGLIO**, a town of the Sardinian states in the province of Coni, six miles west of the city of that name. It is situated on the Grana, and has manufactories of silk. Population, 7,000.

**CARAMBOLA**, or **COROMANDEL GOOSEBERRY**, the fruit of *Averrhoa Carambola*, a small East Indian evergreen tree, belonging to the natural order *Oxalidaceæ*. It resembles the acid fruit of *A. Bilimbi*, and is often cultivated.

**CARAMEL**, the name applied to the dark brown and nearly tasteless substance produced on the application of heat to sugar. It is likewise formed during the roasting of all materials containing sugar, such as coffee, malt, etc., and is one cause of the dark color of porter and infusions of coffee.

**CARAMNASSA**, a river in the sub-presidency of Bengal. After a course of 150 miles it enters the Ganges about 50 miles from its mouth. It is crossed by a stone bridge, which has three wide arches, and which forms part of the grand road from Calcutta to Delhi. It is subject to floods, and has been known to rise 25 feet in one night.

**CARANA RESIN**, a resinous substance of the tropical parts of America. Its properties and uses resemble those of tacamahac. It is entirely soluble in alcohol, and melts at a slight heat.

**CARANJA**, an island four miles long and two miles broad, on the east side of the harbor of Bombay, separated from the main land by a narrow channel. The island is comparatively level and fertile.

**CARAPA**, a genus of plants of the natural order *Meliaceæ*, found in tropical America and in Africa. *C. Guianensis* is a fine large tree, whose wood, called carapa-wood, or crab-wood, is used for making furniture, and also for the spars of ships; its bark is a febrifuge, and its seeds yield a lamp-oil, called carap-oil, or crab-oil. The African species, *C. Touloucouana*, yields an oil called coondi, kundah, or tallicoona, which is used by the natives for anointing their bodies, its bitterness protecting them from the bites of insects. The oil of the South American carapa is sometimes used for the same purpose. See Britannica, Vol. XVII, p. 746.

**CARAPACE**, the dorsal shield or buckler of chelonian reptiles (tortoises and turtles), and of crabs, lobsters, etc.

**CARAT**, a term applied by goldsmiths and assayers to the 24th part of a troy pound, ounce, or any other weight, as a means of stating the proportion of pure gold contained in any alloy of gold with other metals. Thus, pure gold being considered as 24 carats fine, gold containing two parts of alloy is called 22 carats fine, or 22-carat gold. The carat used in this sense has, therefore, no absolute weight; it merely denotes a ratio. The gold used by jewelers is seldom over 18 carats fine, except in wedding-rings, the standard fineness of which is 22 carats. The so-called gold used for jewels, watch-cases, etc., varies from eight or nine to 18 carats fine. The jewelry carat, used as a unit for weighing diamonds and other precious stones, is quite different. It has a fixed weight, equal to 3.16 troy grains, and is divided into quarters, or "carat grains," eighths, sixteenths, etc. These carat grains are thus less than troy grains, and therefore the jeweler has to keep a separate set of diamond weights. This weight was fixed in 1877 by a syndicate of Amsterdam, London, and Paris jewelers at 205 milligrams, and is known as the *Amsterdam or diamond carat*.

**CARAVAGGIO**, a town of Lombardy, Italy, about 24 miles from Milan. Population, 5,880. Three famous painters were born here—Fermo Stella, Pollidoro Caldara (see Britannica, Vol. V, p. 83), and Michel Angelo Amerighi (see Britannica, Vol. V, p. 82). In the neighborhood is a sanctuary of the Madonna, built from designs of Pellegrini.

**CARBAZOTIC**, **CHRYSOLEPIC**, or **PICRIC ACID**, a substance of great importance in dyeing. It is a combination of nitric or sulphuric acid with carboic acid. See Britannica, Vol. V, p. 85.

**CARBIDES**, formerly termed carburets, the compounds of carbon with the various metals. The carbides of iron are the most important, and it is to the addition of carbon, in one way or another, that we are indebted for the valuable properties of cast-iron and steel.

**CARBINE**, a light kind of musket, named probably from the carbins (see next article). The American carbine has a barrel 22 inches in length, and weighs 7½ pounds. It is simple in construction, and has a great range.

**CARBINEERS**, soldiers armed with carbines, and said to have derived their designation from the Arabs, among whom the *Carabins* were light horsemen, stationed at outposts to harass the enemy, defend narrow passages, etc.

**CARBOHYDROGENS**, a term applied to a series of compounds belonging to organic chemistry, which are composed of carbon and hydrogen in such proportions that the various members of the

group differ from one another in definite and regular numbers of atoms of carbon and hydrogen.

**CARBON**, a village of Wyoming, about 80 miles northwest of Laramie. It is the trade center of a rich mining district, and is almost exclusively engaged in business tributary to the mining interests of the surrounding country.

**CARBONADO**, or **BLACK DIAMOND**, an amorphous variety of carbon, brown or black in color, found in Brazil in connection with pure diamonds, and extensively used in diamond drills.

**CARBONATED** or **ACIDULOUS WATERS**. See **ÆRATED WATERS**, *Britannica*, Vol. I, p. 184.

**CARBONDALE**, a city and railroad junction of Jackson county, Ill. The Southern Illinois Normal University is located here. The trade of the city is principally in building-stone, tobacco, cotton, lumber and farm products.

**CARBONDALE**, a city and railroad junction of Osage county, Kan. Coal is mined here.

**CARBONDALE**, a city of Pennsylvania, on the Lackawanna River, 16 miles north-northeast of Scranton, and on the Delaware and Hudson Railroad, at the south terminus of the Jefferson ranch Railroad. Here are extensive anthracite coal mine owned by the Delaware and Hudson Canal Company. The population of the city was, in 1880, 7,714; in 1890, 10,826. See *Britannica*, Vol. V, p. 89.

**CARBONIC OXID**, or **OXIDE**. See **CARBON**, *Oxides of*, *Britannica*, Vol. V, p. 87.

**CARBURETED HYDROGEN**, a term in chemistry applied to several compounds of carbon and hydrogen. Thus light carbureted or monocarbureted hydrogen is the gaseous compound popularly known as marsh gas and fire-damp, and is the principal constituent of coal-gas. Heavy carbureted or bi-carbureted hydrogen is otherwise known as olefiant gas.

**CARCANET**, a jeweled chain or necklace. Venice was famous for the manufacture of carcanets in the 15th century.

**CARCANO**, GRULLO, born in Milan, Italy, in 1812, was brought to public notice in 1835 by his novel, *Ida della Torre*. He was banished in 1849; but on the establishment of national independence he was appointed inspector of schools, and has since held several important offices under the government. He is a poet and novelist of much merit. One of his principal works is a very faithful translation into Italian of the dramatic writings of Shakespeare.

**CARCASS**, in military pyrotechny, a hollow case of iron, filled with combustibles. It is fired from a mortar. Its chief use is to ignite the enemy's buildings, and to give sufficient light to aim the shot and shells. Carcasses were first used by one of the princely ecclesiastics, the Bishop of Munster, when he fought against the Duke of Luxembourg at Groll, in 1672.

**CARCHEMISH**, an ancient city on the Upper Euphrates, northeast of the modern Aleppo. It was long the northern capital of the Hittites, and a city of great importance. It has been identified by George Smith with Jerablús or Jerabis.

**CARDBOARD**, a stiff compact pasteboard made by pasting together several layers of paper, according to the thickness and quality required. *Bristol-board*, used by artists, is made entirely of white paper; ordinary cardboard of fine white paper outside, with one or more sheets of coarse cartridge paper between.

**CARDIA**, the upper orifice of the stomach, called, on account of its vicinity to the heart, by the same Greek name, *cardia*, and probably hardly distinguished from it in the early times of Greek medicine.

**CARDIAC MEDICINES**, stomachic and stimulating remedies; cordials, so called from their action on the heart through the stomach.

**CARDIFF**, a village of New York, situated on Onondaga Creek, chiefly notable for being the place of the pretended discovery of the "Cardiff Giant," a statue carved in Chicago from a block of Iowa gypsum, and then buried at Cardiff. When dug up it was exhibited as a petrified giant.

**CARDIGAN BAY**, a semi-circular bend of St. George's Channel, on the west coast of Wales, 54 miles wide from north to south, and 35 miles long, with a sweep of coast of 130 miles. Almost all the harbors on the coast are obstructed by bars. A great part of Cardigan Bay is said to have been once dry land, protected, as Holland now is, by dikes and dams, and containing 16 towns. The land is said to have been submerged about A. D. 520.

**CARDINAL BIRD**, also called cardinal grosbeak, and Virginia nightingale, one of the finest songbirds of America, belonging to the family *Fringillidæ*. The general color of the male is red, the head being vermilion, and only a small portion of the plumage around the base of the bill being black. The feathers of the crown are long, and erected into a conical crest, like a red cap. The cardinal bird abounds in Texas, Florida and the Southern States generally, migrating northwards in the spring as far as Massachusetts. Its loud, clear, sweet and varied song is to be heard chiefly in the morning and evening.

**CARDINIA**, a genus of fossil conchiferæ, containing 85 species, which extend from the Silurian to the Inferior Oolite. They have an oval or oblong shell, attenuated posteriorly, and marked with lines of growth, and an external ligament. They occur abundantly in valuable layers of clay-ironstone called "mussel-bands."

**CARDINAL VIRTUES**, in ancient philosophy, the virtues of justice, prudence, temperance, and fortitude; so called because the whole of human virtue was supposed to hinge or turn upon them. The cardinal virtues were regarded by the Church as the moral, in distinction from the theological virtues, faith, hope, and charity.

**CARDINGTON**, a village of Ohio, on the Olen-tangy River, 40 miles north of Columbus. It contains manufactories of flour and woollens.

**CARDITIS**, or inflammation of the heart, a form of disease of very rare occurrence if the term be limited in its application to cases of true acute inflammation of the muscular structure of the heart itself. Carditis, however, was formerly understood in a wider sense, so as to include certain forms of disease of the external and internal lining membrane of the heart. See *Britannica*, Vol. XI, p. 554.

**CARDOON**, a vegetable. See *Britannica*, Vol. XII, p. 280.

**CARDUCCI**, GIOSUÈ, generally regarded by his countrymen as the foremost of contemporary Italian poets, was born in 1836 at Val di Castello, near Pietrasanta, in the province of Pisa. His youth was spent in study, and at the age of 25 he was appointed to a professorship in the University of Pisa, from which he was transferred in 1860 to a chair in the University of Bologna. He has been throughout his life a staunch Republican, and in 1867 was for a short time suspended from his professorship for having signed an address to the patriot Mazzini. In 1876 he was returned to the Italian parliament as member for Lugo di Romagna. His earliest poems, *Juvenilia* and *Levia Gravia*, contrast strongly with his later works. Signs of a transition in sentiment and in style appeared in the *Decennalia*, which dealt mainly with political events of the years 1860-70. The change became complete in the *Nuove Poesie*, in which he gave expression to the most advanced



political views. These poems are remarkable for the sustained power and dignity of the language and the frequent nobility of the thought. The *Odi Barbare*, written in meters borrowed from Horace, are very popular with Italians; but to foreign critics Carducci seems in these pieces to have erred in the rejection of rhyme.

CARDWELL, EDWARD, VISCOUNT, English statesman, born in Liverpool, July 24, 1813, died Feb. 15, 1886. He was educated at Oxford, where he became professor of Ancient History. He was elected to Parliament in 1842 as a member of the party known as Peelites, and was president of the board of trade from 1852 to 1855. In 1855 he was returned to Parliament for Oxford. He became secretary for Ireland in 1859, and secretary of state for the colonies in April, 1864, but resigned with his colleagues in June, 1866. In December, 1868, he entered the cabinet of Gladstone as secretary of state for war, and while occupying this position introduced important reforms in the army. Cardwell was raised to the peerage in 1874.

CARE, or CARLE SUNDAY, the Sunday before Palm Sunday, said to be so called because it was the practice in many places to eat gray peas, called carlings, which were steeped all night in water, and fried the next day in butter. This practice apparently had its more immediate origin in the custom of the Roman Catholic church of eating hallowed beans at this time. The beans are described in some religious books as symbolical of confession, and their steeping before use of meditation. It appears to have been adopted from a heathen custom.

CARENING, the operation of heaving down a ship on one side, in order to expose the other side for cleaning by the process of breaming. In seaphrase, a vessel is said to "careen" when she leans over very much through press of sail.

CARÈME, MARIA, ANTONIN, French cook and author, born in 1784 in Paris, died there in 1833. He wrote *Les Dejeuners de l'Empereur Napoléon*, *La Cuisine Française*, and other works connected with his craft. As Talleyrand's cook he played an important part at the Congress of Vienna.

CARET, a mark (A) used in writing, indicating that something has been omitted, and interlined. Derived from the Latin *carere*, "I am wanting."

CAREX, a genus of plants of the natural order *Cyperaceæ*, commonly known as sedges, of which the species are very numerous. They are all of a grassy or rush-like appearance, and have some value in the economy of Nature as forming the principal part of vegetation of swamps, which they assist in converting into fertile ground.

CAREY, HENRY CHARLES, leading political economist of America, son of Mathew Carey, born in Philadelphia, Pa., Dec. 15, 1793, died there Oct. 13, 1879. At the age of 21 he became a partner in his father's business, and later was head of the publishing house. He was the originator of the system of trade sales between book dealers. In 1835 he retired from business, and devoted himself to scholarly pursuits. He was the founder of a school of political economy. At first he was a free-trader, but he came to believe protection the best present policy for the government. His first work was *The Principles of Political Economy*. He afterwards wrote *The Credit System of France*, *Great Britain, and the United States*; *The Past, the Present and the Future*; *Principles of Social Science*; *Letters on International Copyright*; *The Way to Outdo England Without Fighting Her*; *Miscellaneous Works*; and *The Unity of Law*. See *Britannica*, Vol. XIX, pp. 384, 385.

CAREY, MATHEW, publisher, born in Ireland, Jan. 28, 1760, died in Philadelphia, Pa., Sept. 16, 1839. He

was well educated, and selected as his life-work the printing and book selling business. Among his first pamphlets was an inflammatory address to Irish Catholics, which obliged him to flee to Paris to escape trouble. Here he made the acquaintance of Benjamin Franklin. He returned after a year to Ireland, where he established the "Volunteer's Journal," a newspaper very bold in tone, which became a political power. In 1784 an attack on Parliament brought on a suit for libel, and he was imprisoned. He sailed to the United States after his liberation, and within two months had started a newspaper, "The Pennsylvania Herald;" in this first appeared accurate reports of legislative deliberations. For six years he published "The American Museum." The yellow fever epidemic of 1793 showed him to be a philanthropist, and afterwards he wrote a history of the epidemic. He founded the Hibernian Society, and assisted in the formation of the first American Sunday-school Society. He published in 1814 the *Olive Branch, or Faults on Both Sides, Federal and Democratic*, a work designed to conciliate the different factions in the United States which disagreed on the subject of the war of 1812. He issued in 1820 the *New Olive Branch*, and two years later appeared his well-known work, *Essays on Political Economy*, which was followed by a series of tracts advocating the protective system as necessary for the good of all classes.

CAREY, a village of Ohio, 16 miles southwest of Tiffin. It contains manufactories of lumber and iron.

CARIACOU, or VIRGINIAN DEER, a species of deer found in all parts of North America. It is of variable color, light reddish brown in spring, slaty blue in autumn and dull brown in winter. The horns of the adult male are of moderate size, bent strongly backward and then suddenly forward, so as to bring their tips nearly above the nose. The fawn is profusely decked with white spots arranged in lines.

CARIBBEE BARK, or PITON BARK, the bark of *Exostemma Caribæum*, a small tree of the West Indies and of Mexico, belonging to the natural order *Cinchonaceæ*. It is one of the barks sometimes substituted for the cinchona barks.

CARINARIA, a remarkable genus of gasteropodous mollusks, of the order called *Heteropoda* or *Nucleobranchiata*, having a thin shell, in form somewhat like that of a limpet. The shells of some of the species have been denominated Venus's Slipper. The body is gelatinous, and so transparent that much of its interior organization can be seen. The species are all marine. See *Britannica*, Vol. XVI, p. 654.

CARISSA, a genus of plants of the natural order *Apocynaceæ*. *Carissa Carandas* is a thorny shrub, much used for fences in India. The fruit, called carandas, is a berry about the size of a small plum, and is used for tarts and preserves.

CARLÉN, EMILIA SCHMIDT FLYGARE, a well-known Swedish novelist, born at Strömstad, Aug. 8, 1807, died at Onfön, Dalecarlia, in 1883. Her first novel, *Waldemar Klein*, appeared in 1838. She was then a widow, having been married in 1827 to M. Flygare. In 1841, she was again married to J. G. Carlén, a lawyer and a poet. Her literary productiveness was remarkable; many of her works have been translated into English, French and German, and largely circulated both in Europe and America.

CARLETON, SIR GUY, Lord Dorchester, a British soldier, born in Strabane, Ireland, Sept. 3, 1724, died at Maidenhead, England, Nov. 10, 1808. He fought gallantly at Louisburg, Quebec, Belle Isle and Havana. From 1772 to 1775 he governed Quebec.

He led the expedition which invaded New York in 1776 and in 1781, was appointed commander-in-chief of the British army in place of Sir Henry Clinton.

CARLETON, THOMAS, brother of the preceding, and also a soldier, born in 1736, died in Ramsgate, England, Feb. 2, 1817. He served in Wolfe's regiment in 1755, was appointed quartermaster of the army in Canada, was with his brother in the naval conflict with Benedict Arnold on Lake Champlain, was appointed lieutenant-governor of New Brunswick, and in 1784 governor and commander-in-chief of Nova Scotia and Canada. He remained in America 19 years; for 14 years after his return to England he retained those offices, the administration being carried on by his deputies. He was advanced in military rank, and in 1803 he was made a general in the British army.

CARLETON, WILL, author, born in Hudson, Mich., Oct. 21, 1845. He graduated at Hillsdale in 1869, visited Europe in 1878 and in 1885, and is well known by his ballads of rural life. He has lectured in England, Canada and some parts of the United States. His collections of published poems are entitled: *Farm Ballads; Farm Legends; Young Folks' Centennial Rhymes; Farm Festivals and City Ballads*.

CARLINE THISTLE (*Carlina*), a genus of plants of the natural order *Compositæ*. The name is said to be derived from a legend, that an angel showed the root of one of the species to Charlemagne as a remedy for a plague. This species, *C. acaulis*, grows on hills and mountains in the middle latitudes of Europe. It has a very short stem and very large heads of flowers.

CARLINGS, in ship-building, small beams laid fore and aft, and resting upon the main or deck beams. These, with other pieces called "ledges," laid at right angles to them, form a framework by which the deck is supported.

CARLINVILLE, a city in Illinois, the county-seat of Macoupin county. Blackburn University is here located, and there is also a theological seminary. Coal is found here. Population, 1890, 3,293.

CARLISLE, JOHN GRIFFIN, an American statesman, born in Campbell county, Ky., Sept. 5, 1835; taught school in the county, and afterwards at Covington; was admitted to the bar in 1858, and was a member of the House of Representatives from 1859 to 1861. He was elected to the State Senate in 1866, and reelected in 1869; he was also a delegate at large from Kentucky to the National Democratic Convention in 1863. He resigned his seat in the Senate in June, 1871, and was the same year elected lieutenant-governor, serving until September, 1875. The year following he was alternate presidential elector for the State at large. He was a member of consecutive Congresses from the 45th to the 51st, both inclusive, and was Speaker in the 48th, 49th and 50th Congresses. In 1890 he was elected to the United States Senate as a Democrat, to fill the unexpired term of James B. Beck, deceased, taking his seat May 26, of the same year. His service will end March 3, 1895.

CARLISLE SPRINGS, a village of Pennsylvania, four miles north of Carlisle. It is noted for its mineral spring, and is a favorite summer resort. Population of Carlisle, 1890, 7,620. See *Britannica*.

CARLISTS, the name given to the supporters of the Spanish pretender, Don Maria Isador Carlos de Bourbon. See *SPAIN*, *Britannica*, Vol. XXII, pp. 345, 346.

CARLSON, FREDERICK, born in Upland, Sweden, in 1811. In early life he traveled extensively, studying in different universities, and in 1837 became tutor to the prince royal. He has held

many offices under the government. His literary fame rests upon his historical works, the chief of which is *A History of Sweden*.

CARLUDOVICA PALMATA, the screw pine, a small tropical tree of the order *Pandanaceæ*, found in South America. From its leaves are plaited the best quality of Panama hats. Each hat is made from a single leaf, and has no joints.

CARLYLE, a village in Illinois, county-seat of Clinton county, on the Kaskaskia River, about 50 miles east of St. Louis. It contains important manufactories of iron, wagons and plows, and it is seat of a seminary for young ladies.

CARLYLE, ALEXANDER, Scottish Presbyterian ecclesiastic, born Jan. 26, 1722, at Prestonpans, East Lothian (of which parish his father was minister), died at Inveresk, Aug. 25, 1805. He was educated at the Universities of Edinburgh, Glasgow and Leyden, and in 1748 was ordained minister of Inveresk. With Robertson, the historian, he helped to lead the moderate party in the church of Scotland, and enjoyed in succession the highest honors of his connection, being sent to London as the accredited agent of his church, appointed moderator of the General Assembly and dean of the chapel-royal. Carlyle was a man of imposing presence, and of a singularly genial, sagacious and liberal nature. Throughout his long life-time he enjoyed the intimate friendship of some of the most notable men of his time, as Hume, Adam Smith, Smollett and John Home. His *Autobiography*, a charming picture of the social habits of a bygone age, was published in 1860, edited and completed by the Scotch historian, John Hill Burton.

CARLYLE, THOMAS (1795-1881), a British essayist and historian, born at Ecclefechan, a small market town, of Dumfriesshire, Scotland, Dec. 4, 1795. He was the second son of James Carlyle, stonemason, a man of great physical and moral strength, who, though in humble circumstances, was able to give his sons an excellent Scottish education. Thomas received his elementary instruction from his father and mother. His home-teaching was supplemented by attendance at the Ecclefechan school, whence he proceeded in 1805 to Annan Academy, and in 1809 entered Edinburgh University. Except in geometry, his college curriculum was not remarkable, and even in the mathematical class he took no prize. In 1813 he began a fitful preparation for the ministry, which, however, was soon abandoned.

In 1814 Carlyle became mathematical master of Annan Academy, in 1816 assistant teacher at Kirkcaldy, and two years later removed to Edinburgh, where he engaged in private teaching. An introduction to Dr. Brewster led to his writing articles for the *Edinburgh Encyclopedia*, and subsequently to his translating Legendre's *Elements of Geometry*. At the beginning of the session of 1819 he enrolled in the class of Scots Law; but he found law as uncongenial a study as divinity. In 1822, while engaged as a private tutor, he arranged to write a *Life of Schiller* for the "London Magazine," and a translation of the *Wilhelm Meister* of Goethe for an Edinburgh publisher.

In 1824 Carlyle paid his first visit to London, where he remained some months, superintending the publication in book form of his *Life of Schiller*. At this time he made the acquaintance of Coleridge, Thomas Campbell, Cunningham, Procter and other eminent literary men. In the spring of 1825 he removed to a farm near Mainhill, which he had leased, his brother attending to the farming while he himself translated German romances. His marriage with Miss Welsh took place in 1826, and



they at once settled in Edinburgh. Here Carlyle completed four volumes of translations, which were published under the title of *German Romances*, and became a contributor to the "Edinburgh Review."

In 1828 the Carlyles removed to Mrs. Carlyle's property of Craigenputtock, and there they lived for about six years. During this period Carlyle subsisted by writing for a number of reviews. He also wrote a *History of German Literature*, the best parts of which were subsequently published in the form of essays, and in 1833-34 there appeared by instalments, in "Fraser's Magazine," *Sartor Resartus*, his most characteristic work. Carlyle's quiet life at Craigenputtock was varied by occasional visits to Edinburgh, and by a residence of six months in London, during which time he made the acquaintance of John Stuart Mill and John Sterling.

In 1834 Carlyle resolved to try his fortune in London, and in the summer of that year established himself in the house at Chelsea in which he lived till the day of his death. Here he settled down to the writing of his *French Revolution*, which appeared in 1837. During the years 1837-40 he lectured to considerable yet select audiences, and his yearly earnings from these lectures maintained him and his wife till the *French Revolution* not only established his reputation as a literary genius of the highest order, but placed him beyond the possibility of want. In 1838 appeared *Sartor Resartus* in book-form, and the first edition of his *Miscellanies*. In 1845 he published *Cromwell's Letters and Speeches*, perhaps the most successful of all his works, inasmuch as it completely revolutionized the public estimate of its subject. In 1851 he published a biography of his friend John Sterling. From this time Carlyle gave himself up entirely to his largest work, the *History of Friedrich the Second, Called Frederick the Great*, the first two volumes of which were published in 1858, and which was concluded in 1865.

In November, 1865, Carlyle was elected Lord Rector of Edinburgh University, and in the following April the ceremony of his installation took place amid extraordinary demonstrations of enthusiasm. A few days later news reached him in Dumfries of the death of Mrs. Carlyle. His grief developed into remorse when he discovered from certain of her letters and her journal that, during a period of their married life, his unconscious want of consideration for her had caused her much misery. It has also been demonstrated by the *Letters and Memorials of Jane Welsh Carlyle* that at one time they were somewhat estranged. These *Memorials* are of note as proving Mrs. Carlyle to have been one of the keenest critics, most brilliant letter-writers and most accomplished women of her time. Carlyle wrote no important work after his wife's death. In 1874 he was offered and accepted the Prussian Order of Merit in recognition of his having written the life of Frederick the Great, who founded the order. In the same year Disraeli offered him the Grand Cross of the Bath (with the alternative of a baronetcy) and a pension, but he declined both. He died at his house in Chelsea, Feb. 5, 1881. A burial in Westminster Abbey was offered, but, in accordance with his own wish, he was laid in the churchyard of Ecclefechan beside his kindred.

Of Carlyle's position in literature it may be said without risk of contradiction, that, for good or evil, he exerted a greater influence on British literature during the middle of the 19th century, and, through that literature, on the ethical, religious, and political beliefs of his time, than any of his contemporaries.

CARMAGNOLE, the name of a popular song and dance which was notorious as the accompaniment of many excesses in the French Revolution. It became popular in the South of France, where it was possibly named after Carmagnola in Italy. Fashion soon adopted the word, which was next applied to a sort of jacket worn as a symbol of patriotism. With the Reign of Terror both the song and jacket, associated with so many dismal recollections, disappeared.

CARMEL, a village of New York, county-seat of Putnam county, 55 miles north of New York city. It is the seat of Drew Seminary for Young Ladies.

CARMEL, Knights of the Order of Our Lady of Mount, instituted by Henry IV of France. The order consisted of 100 gentlemen, all French, who were to attend the king in his wars, and had considerable revenues assigned to them. The order was confirmed by bull by Pope Paul V, in 1607. The great master was created by the king putting about his neck a tawny ribbon, suspending a cross of gold, with the cloak of the order, and granting him power to raise 100 knights. None were admitted but those who had four descents of nobility, both by father and mother.

CARMEN, SYLVA, the pseudonym of Elizabeth, Queen of Roumania, born Dec. 29, 1843, the daughter of Prince Herman of Wied Neuwied and Maria of Nassau, and married King (then Prince) Charles of Roumania in 1869. Since the death of her only child, in 1874, she has devoted much time to literature. Two poems, printed privately at Leipzig in 1880, were followed by *Sturme* (Bonn, 1881), *Leidens Erdengang* (Berlin, 1882); translated into English as *Pilgrim Sorrows*, by Helen Zimmern, 1884), *Jehovah* (Leipzig, 1882), *Ein Gebet* (Berlin, 1882), *Pensées d'une Reine* (Paris, 1882), and *Pelesch-Marchen* (Leipzig, 1883). During the war of 1877-78 she endeared herself to her people by her devotion to the wounded soldiers, and since that time has interested herself in establishing and fostering the national women's industries.

CARMI, a city of Illinois, county-seat of White county, situated at the head of navigation on the Little Wabash, about 100 miles northeast of Cairo. It contains a number of flour-mills and manufactories of woollens and iron.

CARMINATIVES, medicines to relieve flatulence and pain in the bowels, such as cardamoms, peppermint, ginger, and other stimulating aromatics.

CARMÖE, or KARMÖE, an island of Norway, at the entrance of the Bukke Fiord, in the North Sea, 20 miles northwest of Stavanger. It has a population of 6,400, who are principally engaged in the fisheries and in cattle-rearing.

CARNAHUBA PALM, or CARNAUBA PALM, a very beautiful species of palm, a native of Brazil. It attains a height of 20 to 40 feet, and its timber is used in Brazil for a great variety of purposes. The fruit is black, and about the size of an olive. It is sweet, and is eaten raw and also prepared in various ways. Scales of wax cover the under side of the leaves, and drop off when the fallen and withered leaves are shaken. Being collected in this way, the wax is melted into masses, and forms an important article of commerce. See WAX, Britannica, Vol. XXIV, p. 459.

CARNARIA, the name given by Cuvier to the flesh-eaters, or third order of mammals. Cuvier at first included the marsupial quadrupeds in this order, but afterwards, recognizing more fully the great importance of the characteristic from which they derive their name, constituted them into a distinct order; the remaining Carnaria being divided into *Cheiroptera*, *Insectivora*, and *Carnivora*.

**CARNARVON, HENRY HOWARD MOLYNEUX HERBERT, EARL OF** (1831-90), born in 1831, died Jan. 28, 1890. He was educated at Oxford, and succeeded his father as fourth earl in 1849. He entered the Upper House as a Conservative, and in 1866 accepted from Lord Derby the office of colonial secretary, but resigned in 1867. On Disraeli's return to power in 1874, Lord Carnarvon resumed office as colonial secretary—once more, however, to resign in January, 1878, in consequence of the dispatch of the British fleet to the Dardanelles. During the brief Conservative administration of 1885-86 he was Lord-Lieutenant of Ireland, and his negotiations with Mr. Parnell gave rise, two years later, to considerable controversy. He was author of *The Druses of Mount Lebanon* (1860); *Reminiscences of Athens and the Morea* (1869); and translations of the *Agamemnon* (1879), and the *Odyssey* (1886).

**CARNATIONS**, flesh-tints in painting. The art of producing the real color of flesh, from the rarity with which it is acquired by artists, would seem to be one of the most difficult branches of coloring.

**CARNATION**, in botany, a double-flowering variety of the clove pink. It is a native of the south of Europe, and in its wild state is single-flowering, and of a lilac-purple color.

**CARNEGIE, ANDREW**, manufacturer, born in Dunfermline, Scotland, Nov. 25, 1835. His father was a weaver, who, in the hope of bettering his family, came to the United States, where the son found employment at Pittsburgh, Pa., in tending a small stationary engine. Dissatisfied with this, the boy became telegrapher for the Atlantic and Ohio Company. While in the employ of the superintendent of the telegraph lines he met the inventor of the sleeping-car, Mr. Woodruff, and, seeing the value of the invention, engaged in the enterprise of getting it into use. This venture laid the foundation for his immense fortune. He became superintendent of the Pittsburgh division of the Pennsylvania railroad; was at one time a member of an oil syndicate which realized \$1,000,000 annually in cash dividends; established, in company with others, a rolling-mill, and in the extension of this last-mentioned enterprise Mr. Carnegie has become the controller of the largest system of iron and steel-works in the world. He has owned and controlled 18 English newspapers. Mr. Carnegie frequently writes on the labor question, and is the author of *An American Four-in-Hand in Britain; Round the World; Triumphant Democracy: or, Fifty Years' March of the Republic*. Besides carrying on immense business enterprises, Mr. Carnegie has established generous charities. His native country has been remembered in the gift of \$250,000 for a free library in Edinburgh, and in the erection (1879) of extensive swimming baths and the gift of \$40,000 to establish a free library for the use of the citizens of Dunfermline. Bellevue Hospital, in New York city has been endowed with \$50,000 for a Carnegie laboratory; Pittsburgh, Pa., has received \$500,000 for a free library, while Allegheny City has been given half that amount for a music hall and library. Mr. Carnegie has established free libraries for the use of his employés at several places.

**CARNIFE FERRY**, the place in Nicholas county, W. Va., where a fierce battle was fought between the Federals and Confederates, Sept. 10, 1861.

**CARNOCHAN, JOHN MURRAY**, surgeon, born in Savannah, Ga., July 4, 1817, died in New York city, Oct. 28, 1887. He was educated in the University of Edinburgh, and was fitted for the medical profession by studying with Dr. Valentine Mott, of New York, and by attending lectures in London, Paris, and Edinburgh. He became an eminent surgeon, and, being possessed of great skill and steady nerves,

he performed many remarkable and delicate surgical operations. For many years he was professor in the New York Medical College.

**CARNOT, LAZARE HIPPOLYTE**, a son of the celebrated French statesman and mathematician, born at St. Omer in 1801, died in 1888. He was a radical republican of much note. His principal literary works were memoirs of his father, and an able work on *Saint-Simonism*.

**CARNOT, MARIE-FRANÇOIS SADI**, son of Lazare Hippolyte, born at Limoges in 1837. He became a leader of the strict republicans; was a member of the National Assembly in 1871; of the Chamber of Deputies in 1876; and was successively secretary of the Chamber, under secretary and minister of public works, and minister of finance. He became president of France in 1887.

**CARO, ELME MARIE**, French philosopher, born at Poitiers, March 4, 1826, died July 13, 1887. He studied at the École Normale, of Paris, at Angers, and Douai; in 1857 became a lecturer at the École Normale, and, ten years later, professor at the Sorbonne. In 1876 he was elected to the French Academy. Caro's Wednesday lectures at the Sorbonne were exceedingly popular. His chief works are: *Le Mysticisme au XVIII<sup>e</sup> Siècle* (1852-54); *L'Idée de Dieu et ses nouveaux Critiques* (1864); *Le Matérialisme et la Science* (1868); *Le Pessimisme au XIX<sup>e</sup> Siècle* (1878); *La Philosophie de Goethe* (2d ed. 1880); *George Sand in Les Grands Écrivains Français*, and *Mélanges et Portraits* (1888).

**CAROL-TREE**. See LOCUST-TREE, Britannica, Vol. XIV, p. 767. See also Vol. III, p. 460, and Vol. V, p. 623.

**CARPACCIO, VITTORE** (1450-1522), a painter of the early Venetian school, born in Istria about 1450. In 1490-95 he painted nine subjects from the life of St. Ursula, which are now preserved in the Accademia di Venice. About 1494 he executed another work now in the same collection, *The Patriarch of Grado Casting Out a Devil*, which possesses much antiquarian interest, from its accurately detailed view of the Rialto. His next great series of works was the nine subjects from the lives of the Saviour, and Saints Jerome, George, Tryphonius, (1502-08), painted for the school of San Giorgio de Schiavoni, and still preserved there. In 1510 he executed the *Presentation in the Temple*, now in the Accademia, which is usually regarded as his masterpiece. His latest dated works, at Pirano and Pozzale, are inscribed 1519; and he is believed to have died about 1522.

**CARPEL**, in botany, a simple pistil or one of the several parts of a compound pistil. See Britannica, Vol. IV, p. 141.

**CARPENTER, MARY**, an English philanthropist, born at Exeter, April 3, 1807, died June 14, 1877. Trained as a teacher, she took an active part in the movement for the reformation of neglected children, and besides advocating their cause in her writings, she founded a ragged school at Bristol in 1846, and several reformatories, one of which, the Red Lodge Reformatory, she superintended. She promoted the Industrial Schools Act of 1857, and some of her proposals were adopted in the amended acts of 1862 and 1866. In the prosecution of her philanthropic labors she visited India four times, had an interview with the Queen in 1863 in connection with her work, and in 1870 instituted the National Indian Association, whose journal she edited. She attended at Darmstadt a congress on women's work, as a guest of the Princess Alice, and visited America in 1873. Her plan of day-feeding industrial schools in connection with school boards was adopted in 1876. Besides her reformatory writings she published *Our Convicts* (1864), *The Last*



*Days of the Rajah Rammohun Roy* (1866), and *Six Months in India*.

CARPENTER, MATTHEW HALE, Senator, born in Moretown, Vt., Dec. 22, 1824, died in Washington, D. C., Feb. 24, 1881. He studied military science at West Point for two years, then went to Vermont, where he read law with Paul Dillingham, who afterwards became governor. Mr. Carpenter was in the office of Rufus Choate in 1847, but the following year he removed to Beloit, Wisconsin. He was engaged in the *quo warranto* proceedings against Gov. William A. Barstow, of Wisconsin, and was the successful lawyer in vindicating the government reconstruction acts of 1867, in the McCardle case of 1868, when Jeremiah S. Black was opposing counsel. This was a test case, and the most important ever tried up to that time before the U. S. Supreme Court. From 1869 to 1881 he served in the U. S. Senate with the exception of one term. Senator Carpenter was a war Democrat, but in the particular tenets of his political faith disagreed with many of his party. He opposed the fugitive slave law, advocated emancipation, and the enfranchisement of the slaves, and believed that the State and government should control railroads and other semi-public organizations.

CARPENTER, PHILIP PEARSALE, naturalist, born in Bristol, England, Nov. 4, 1819, died in Montreal, Can., May 24, 1877. Educated in Edinburgh University and the Manchester new college, he became a Unitarian minister and held several pastorates, becoming widely known for his benevolence. For years he studied conchology and became an authority on this subject. He catalogued the Mazatlan shells of the British Museum and arranged collections of shells for the Smithsonian and other American institutions. He presented valuable collections of shells to the British Museum and to McGill University.

CARPENTER, WILLIAM BENJAMIN, C. B., an English physiologist (1813-85), eldest brother of Mary Carpenter, born at Exeter, Oct. 29, 1813, died Nov. 19, 1885. He was educated at Bristol, passed some time in the West Indies, and afterwards studied medicine at Bristol, London, and Edinburgh. His graduation thesis (1839) on the nervous system of invertebrate animals prepared the way for his *Principles of General and Comparative Physiology*, one of the earliest works giving a general view of the science of life. Removing to London in 1844, he was appointed Fullerian Professor of Physiology at the Royal Institution, lecturer or professor at the London Hospital and University College (1849), examiner at the University of London, and its registrar (1856). He also edited (1847-52), the *British and Foreign Medico-Chirurgical Review* and a *Popular Cyclopaedia of Science*. On his retirement in 1879 he received the distinction of C. B. While vice-president of the Royal Society he secured government aid in the investigations in marine zoology.

Carpenter and his colleagues made three voyages to the North Atlantic and Mediterranean. He made valuable researches on the *Foraminifera*; on the *Eozoon Canadense*; on feather-stars and crinoids. His deep-sea explorations led him to advocate the doctrine of vertical ocean circulation sustained by opposition of temperature only, independent of and distinct from the horizontal currents produced by winds. See ATLANTIC, *Britannica*, Vol. III, pp. 22-24.

Carpenter received medals from the Royal and Geological Societies, and was corresponding member of the Institute of France (1873). The more important of his writings are: *Principles of Human Physiology* (7th ed., 1869); *Principles of Mental Physi-*

*ology*; *Animal Physiology*; *Manual of Physiology*; *Zoology and Instincts of Animals*; *Microscope and its Revelations* (5th ed., 1875); *Introduction to the Study of the Foraminifera*; *Physiology of Temperance* (1870); *Mesmerism and Spiritualism* (1877).

CARPENTER BEE, a name given to the different species of hymenopterous insects of the genus *Xylocopa*, so called because they excavate their nests in wood. In general appearance they resemble common bumble-bees. *X. violacea*, a very large bee with deep violet wings, is found in Southern and Middle Europe; the species are numerous in Asia, Africa, and America. They usually construct their nests in partially decayed wood, cutting out a hole a foot or more in length, which they divide into a number of chambers by partitions of glued saw-dust, the roof of each chamber as it is made forming the floor of the one above. In each of these cells an egg is deposited with a store of honey and pollen.

CARPENTER, SHIP'S, an officer of a ship whose duty it is to attend to necessary repairs of hull, masts and spars. During battle he watches for shot-holes, and is prepared with plugs to stop them up. He makes a daily return to the senior lieutenant of each day's work, and is expected to be always able to report as to the ship's qualities. He is assisted by a carpenter's mate, and a carpenter's crew.

CARPET-BAGGER, a term applied after the American civil war of 1861-65 to political adventurers from the Northern States, who, taking advantage of the disorganized state of affairs in the South, tried to gain control of the public offices and to exert an influence over negro voters for their own selfish ends. The term implied that they had no property in the district save the contents of their carpet-bags.

CARPET-MAKING, See *Britannica*, Vol. V, pp. 127-31.

CARPINO, a town of Italy in the province of Foggia, twenty-two miles northeast of San Savero. Population, about 6,000.

CARPOLITES, a generic term applied to fossil fruits. One hundred species of such fruits have been described, seventy of which belong to the Carboniferous system.

CARR, EUGENE A., soldier, born in Erie county, N. Y., March 20, 1830. In 1850 he graduated at the U. S. Military Academy, and up to 1861 was engaged in expeditions against the Western Indians. During the civil war he served under Hunter, Halleck, and Curtis; fighting in Arkansas, Missouri, Mississippi, and being present at the battles of Wilson's Creek, Pea Ridge, Vicksburg, Port Gibson, Champion Hill, Edwards' Station, Black River Bridge, Little Rock, Clarendon and Camden. At the close of the war he was brevetted major-general U. S. A., and since that time has been on frontier duty, where he was engaged against the Apache Indians.

CARR, JOSEPH B., soldier, born in Albany, N. Y., August 16, 1828. In 1849 he entered the militia, and on the outbreak of the civil war his regiment was the first to encamp in the State of Virginia. In 1862 he was made brigadier-general of volunteers. He was present at the battles of Malvern Hill, Fredericksburg, Chancellorsville, and Gettysburg, and during the latter part of the war served on the defenses of James River. For meritorious service he was promoted to the rank of major-general. He was mustered out of service at the close of the war, and became a manufacturer of chain-cable. He was Secretary of State in New York in 1881 and 1883, and was the Republican candidate for lieutenant-governor in 1885.

**CARR, SIR ROBERT**, born in Northumberland, England, died in Bristol, June 1, 1667. He was one of the royal commissioners of New England appointed by Charles II in 1664. The colonists resisted the interference of the commissioners, and at New Amsterdam the Dutch settlers fought the English fleet. The commissioners conquered the Dutch and re-named the town, calling it New York, in honor of the Duke of York. Fort Orange surrendered to Sir Robert and his associates, and was given the name of Albany. The Swedes and Dutch along the Delaware River were forced to acknowledge the English authority, but the commissioners had some trouble with the people of Boston. In Casco, Maine, the inhabitants received the royal representatives very kindly, and a new government was instituted, which acknowledged the authority of the commission. Having accomplished his mission Sir Robert returned to England, and died the day after his arrival.

**CARRERA, JOSÉ MIGUEL**, a Chilian soldier, born in Santiago de Chili, July 19, 1782, died in Mendoza, Argentine Republic, Sept. 1, 1815. He was educated in Madrid, fought the French, and came to Chili upon hearing of the revolution, and became sufficiently popular with the chiefs to depose Rosas and to assume the government. He was proclaimed dictator and general July 19, 1812. By acts of severity he managed to keep control of the government till Nov. 27, 1813, when he was deposed. The following year he raised a rebellion, but the Spaniards routed him, and he fled to Mendoza. In 1815 he fell into the hands of his enemies and was executed.

**CARRERA, RAFAEL**, president of Guatemala, born in the city of Guatemala in 1814, died April 14, 1865. He was of Indian and negro descent, and began life as a drummer boy and herder in 1829. When Guatemala revolted in 1839 Carrera commanded 6,000 Indian mountaineers in the war which followed. He grew in favor with the aristocratic and clerical party, and was able to reinstate as ruler Rivera Paz, and soon became commander-in-chief of the army. Morazán, who had been president, was forced to abandon Guatemala, with the army which had supported him, and Carrera became president on March 21, 1847. He ruled for a year, then resigned and went to Mexico. Wars called him home, and, after defeating the enemies of Guatemala, he was reelected president in October, 1851. In 1854 he was chosen president for life. Carrera opposed the plan for a confederation of the Central American States. He was an ignorant man, the foe of order and civilization. He administered the government with considerable severity.

**CARRIAGE**. See *Britannica*, Vol. V, pp. 134-37. **CARRICAL**, or **KARICAL**, a French port within the limits of Tanjore, a district of the presidency of Madras. The town and territory contain 63 square miles, and about 50,000 inhabitants.

**CARRICK**, the southern division of Ayrshire. The Prince of Wales is Earl of Carrick.

**CARRICK-ON-SHANNON**, the capital of County Leitrim, Ireland, on the Shannon, 98 miles northwest of Dublin by rail.

**CARRICK'S FORD**, a place in West Virginia, on the Cheat River, in George Tucker county, where the Confederates under Gen. Garnett were routed from their position by General Grant's forces. The engagement took place July 13, 1861. General Garnett was killed.

**CARRIER**. See *Britannica*, Vol. V, pp. 138-39.

**CARRIER, COMMON**, one who, for hire, undertakes the conveyance of goods or passengers. See *Britannica*, Vol. V, pp. 138-39. There is an im-

portant distinction between a *common carrier* and a *private carrier*. A common carrier is bound by law to serve the public generally without favoritism or discrimination, and is held responsible for the safe delivery of all property delivered to his care. Railway companies, steamboat lines, express companies, and other carriers have endeavored to escape or limit this liability by incorporating in the bill of lading a contract to the effect that in case of loss or damage to property in transit the carrier should not be liable beyond a certain sum. But the American courts have held that, in so far as this provision seeks to avoid liability for injury resulting from the negligence of the carrier or its employes, it is against public policy, and therefore void. It seems, therefore, well settled that in case of damage occasioned by negligence the carrier must respond for all losses sustained. On the other hand, the law exempts the carrier from liability for injury occasioned by the "act of God" or by such agencies as human foresight and prudence cannot successfully guard against. Deception or misrepresentations by the owner of the goods, as undervaluation, etc., will also avoid or limit the carrier's liability.

**CARRIER PIGEON**, a variety of domestic pigeon trained to convey written messages from one place to another. See *Dove*, *Britannica*, Vol. VII, pp. 379-80.

**CARRIERE, MORTZ**, German philosophical writer, born at Griedel, in Hesse, March 5, 1817, studied at Giessen, Göttingen and Berlin, and in 1853 became professor of philosophy at Munich. He is one of the founders of the modern school of thought which endeavors to reconcile Deism and Pantheism. His important work, *Die Kunst im Zusammenhang der Kulturentwicklung und die Ideale der Menschheit* (5 vols., 1863-74), was so popular that a third edition was commenced in 1876. He has also published *Die Sittliche Weltordnung* (1877), a thoughtful monograph on Cromwell, and works on *Æsthetics*.

**CARRINGTON, HENRY BEEBE**, soldier, born in Wallingford, Conn., March 2, 1824. In 1845 he graduated from Yale, taught for three following years in Irving Institute, N. Y. then studied law at New Haven and again engaged in teaching, being an instructor in the Ladies' Collegiate Institute of New Haven. He removed to Columbus, Ohio, practiced law, engaged in the anti-slavery movement, and helped organize the State militia. When President Lincoln issued the first call for troops, Carrington, who was adjutant-general of the State, placed nine regiments of militia in western Virginia. During the war he was for most of the time engaged in raising and drilling troops, and he was promoted brigadier-general of volunteers. He was mustered out of this service in 1865, and until 1870 served on military expeditions in Nebraska, Montana and Colorado, and became instructor of military science in Wabash College. The rest of his life has been given to literary pursuits. Among his publications are: *Russia as a Nation*; *American Classics*; or, *Incidents of Revolutionary Suffering*; *Crisis Thoughts*; *Ab-sa-ra-ka, Land of Massacre* (relating the adventures of his wife on the plains); *Battle Maps and Charts of the American Revolution*; and *Battles of the Bible*.

**CARRION-CROW**, or **BLACK VULTURE**, of America, a native of the southern part of the United States. It feeds entirely on carrion. The name is also applied to the common crow of Europe, which sometimes feeds on carrion.

**CARRION-FLOWER**, a name which has been given to the flowers of many species of *Stapelia*, on account of their odor, which resembles that of putrid meat. The species are natives of the Cape



of Good Hope. The flowers are large and often beautiful.

CARROLL, CHARLES, of Carrollton, born in Annapolis, Md., Sept. 20, 1737, died in Baltimore, Nov. 14, 1832. He was a descendant of powerful and royal families of Ireland. He was educated at the Roman Catholic schools of France and studied law in London. Returning to the United States in 1764, he took an active part in the politics of his native State; was elected to the Continental Congress in 1775, and the following year his name was affixed to the Declaration of Independence—signed as Charles Carroll, of Carrollton, because a relative bore the same name, and whatever responsibility was attached to the act he was willing to bear. Afterwards he served in the Maryland Senate, and in 1788 was the first Senator from Maryland to sit in the National Congress under the Constitution of the United States. From 1791–93 he was again in the United States Senate, and he subsequently served in the State Senate until 1801. He was the last surviving Signer of the Declaration of Independence.

CARROLL, JOHN, Roman Catholic archbishop, born in Upper Marlborough, Md., in 1735, died in Georgetown, D. C., in 1817. He was a cousin of Charles Carroll, of Carrollton; was educated at Roman Catholic schools in France, became a Jesuit priest, and engaged in the struggle of the people of his faith for religious toleration in America. He was the first bishop of his denomination in the United States, and in his official capacity did much for the upbuilding of colleges and other schools. He founded Georgetown College; helped establish St. John's College at Annapolis; laid the foundation of the Baltimore cathedral in 1806, and was created archbishop in 1808. He was the intimate friend of Benjamin Franklin, and officiated in 1803 at the marriage of Prince Jerome Bonaparte with Miss Elizabeth Patterson, of Baltimore.

CARROLL, SAMUEL SPRIGG, soldier, born in Washington, D. C., Sept. 21, 1832. In 1856 he graduated at the United States Military Academy. During the civil war he was engaged in the battles of Cedar Mountain, the Rapidan, Fredericksburg, Chancellorsville, Gettysburg, the Wilderness and Spotsylvania, where he was severely wounded. He was brevetted brigadier-general U. S. A., in 1865, and in 1869 was retired from the army as major-general.

CARROLLTON, a city of Illinois, county-seat of Greene county, 34 miles north of Alton. It contains manufactories of iron, machinery, carriages and flour.

CARROLLTON, a village of Kentucky, county-seat of Carroll county, situated on the Ohio River, at the mouth of the Kentucky. It is the seat of a seminary, and contains manufactories of cotton goods, woollen goods and flour.

CARROLLTOWN, county-seat of Carroll county, Mo. It contains flour mills and a woollen factory, and has a school building which cost \$40,000. It is the seat of a Roman Catholic convent.

CARRONADE, a short iron gun, long superseded, named after the Carron Iron Works, of Scotland, where it was first made. It is lighter than ordinary guns, and has a chamber for powder like mortars.

CARROT. See Britannica, Vol. I, p. 369, and Vol. XII, p. 280.

CARROUSEL, a species of knightly exercise which was very common in the courts of Europe. It was an imitation of the tournament, and for a time seems to have supplied its place. The name is now applied to a revolving contrivance also called a "merry-go-round."

CARRUTHERS, WILLIAM A., novelist, born in Virginia about 1800, died in Savannah, Ga., about 1850. He was educated for the medical profession, but became famous as a writer of sketches and historical romances. Among his published works were: *The Cavaliers of Virginia*; or, *The Recluse of Jamestown*; *The Kentuckian in New York*; *The Knights of the Horse-Shoe: a Traditional Tale of the Coked Hat Gentry in the Old Dominion*; and *A Life of Dr. Caldwell*. He also published an account of a perilous ascent of the Virginia Natural Bridge.

CARSE, a term applied in Scotland to low lands adjoining rivers. In Stirlingshire it is restricted to the level alluvial soils, which are only a few feet above the River Forth. In Perthshire it applies to the whole of the slightly undulating lands to the north of the Tay, which form the carse of Gowrie. Carse soils usually consist of argillaceous deposits, which produce crops of great luxuriance.

CARSON, CHRISTOPHER ("Kit Carson"), soldier, born in Madison county, Ky., Dec. 24, 1809, died at Fort Lynn, Colo., May 23, 1868. His boyhood was spent in what was then the wilderness of Missouri, and at the age of seventeen he joined a hunting party, and commenced a roving life on the plains. He served as guide for Gen. John C. Fremont in his explorations; became familiar with more Indian tribes than any man since his time, and could speak their language equally as well as his own; assisted in making treaties between the United States and the Indians; served the Government in New Mexico, Colorado and the Indian Territory during the Mexican and civil wars, and for his conduct in the latter was brevetted brigadier-general.

CARSON CITY, a city of Nevada, capital of the State and county-seat of Ormsby county. It is beautifully situated in the midst of grand and picturesque scenery on a plateau at the base of the Sierra Nevadas, about 15 miles south of Virginia City. It contains a United States branch mint, railroad shops and offices, various manufactories, and several mills for extracting gold and silver, which are found in the vicinity. Carson City was founded in 1858; its incorporation dates from 1876. Its schools are noted for their excellence.

CARSON RIVER, a stream of Nevada, 150 miles long. It rises in the Sierra Nevada Mountains, and flows northeast into Carson Lake, a body of water 15 miles long, which has no outlet.

CARSTENS, ASMUS JACOB, an eminent German artist, born near Schleswig in 1754, died at Rome in 1798. In 1762 he went to Copenhagen, where in 1769, he produced his *Baldur's Death* and *Æolus and Ulysses*. He subsequently went to Berlin, where his great composition, the *Fall of the Angels*, with 200 figures, gained for him an appointment as professor in an academy, while his decoration of a saloon in the Dorville Palace obtained for him an introduction to the king and a pension. He also visited Rome, and devoted himself to the study of the works of Michel Angelo and Raphael. His *Visit of the Argonauts to the Centaur Chiron* was distinguished by purity of style, beauty of forms, and fine distribution of light.

CARTE-BLANCHE, a paper authenticated with a signature and intrusted to some one to be filled up as he may think best. Thus, in 1649, Charles II tried to save his father's life by sending from The Hague to the Parliament a signed carte-blanche to be filled up with any terms, which would be accepted as the price of his safety. The term is used figuratively of unrestricted power to act or decide in a particular manner.

CARTEL, during the time of war, an agreement between the belligerents for an exchange of prisoners. Sometimes the name is given to a ship com-

missioned to convey the exchanged prisoners or to carry messages to the enemy. A ship when thus employed must carry no cargo, ammunition, or implement of war, except one gun for signals.

CARTER, PETER, publisher and brother of Robert, born in Earliston, Berwickshire, Scotland, July 19, 1825. In 1832 he came to the United States with his parents; received a common school education, and in 1848 was admitted as partner in the publishing house of Robert Carter and Brothers. He has been connected with temperance, charitable and Sunday-school work, and has written a book concerning his travels in Scotland, and also story books for children.

CARTER, ROBERT, publisher, born near Abbottsford, Berwickshire, Scotland, Nov. 2, 1807, died in New York city, Dec. 28, 1889. His father was a weaver by trade, and the son had little opportunity for gratifying his love of study, being compelled to help in supporting the family. By diligently improving his opportunities, however, the lad acquired some education, and at the age of fifteen opened a night school in his father's cottage. He entered the University of Edinburgh, and made rapid progress, but in 1831 came to America, where his first occupation was school teaching in the city of New York. Here Hon. Schuyler Colfax was one of his pupils in Latin and Greek. In 1834 he became a book-seller, and in 1848 took into partnership his brothers Walter and Peter, and the present firm name, Robert Carter & Brothers, was adopted. Mr. Carter made it a rule to publish books that would do good, not only such as would sell readily. He was a Presbyterian in religious belief, and frequently a delegate to the Synod and the General Assembly.

CARTER, ROBERT, editor, born in Albany, N. Y., Feb. 5, 1819, died in Cambridge, Mass., Feb. 15, 1879. His education was obtained at the common schools and at a Jesuit college of Chambly, Canada. In 1841 he started, in company with James Russell Lowell, a magazine called "The Pioneer." Although the corps of writers was an unusually fine one, the venture was not a success, and but three numbers were issued. In 1847 he was a private secretary to the historian Prescott, and after the latter's death wrote an elaborate article concerning his habits and character. In 1851 he became editor of the Boston "Commonwealth," the organ of the Free-soil party. In 1855 Mr. Carter was one of the editors of the Boston "Telegraph;" the following year he edited the "Atlas;" from 1857-59 he was Washington correspondent for the New York "Tribune;" from 1864-69 he edited the Rochester "Democrat;" and from 1870-73 he edited "Appleton's Journal." Mr. Carter wrote important articles in the first edition of the *American Cyclopædia*; the articles on "Egypt," "Hindustan" and the history of the United States were written by him. He assisted in the revision of this cyclopædia. Mr. Carter traveled in Europe for his health; wrote *A Summer Cruise on the Coast of New England*, and at the time of his death left an incomplete volume of memoirs.

CARTER, SAMUEL POWHATAN, naval officer and soldier, born in Elizabethtown, Carter county, Tenn., Aug. 6, 1819. He studied at Princeton; served as midshipman in the navy; was promoted and assigned to the *Ohio*; was engaged off the Mexican coast during the Mexican war; was a member of the expedition which captured the barrier forts, near Canton, China (1856); was appointed instructor in seamanship at Annapolis the following year, and when the war broke out was transferred to the War Department for a time, and assigned to the task of organizing troops in Eastern Tennessee. He was assigned to active duty after-

wards, and while in the field was present at Zollicoffer's repulse at Wild Cat, Ky.; fought at Cumberland Gap; led the cavalry expedition which destroyed nearly 100 miles of railroad track in Tennessee; assisted at the siege of Knoxville; and held various commands up to 1866, when he was mustered out of service, having been brevetted major-general in the preceding year. Returning to the navy he commanded at the Annapolis Academy from 1869-72, and received several promotions, being commissioned commodore in 1878. He retired from the service three years later, and was made rear-admiral in 1882. He died in 1891.

CARTERET, PHILIP, English navigator, sailed as lieutenant in Byron's voyage, and commanded the second vessel in Wallis's expedition to the Southern hemisphere (August, 1766). In the following April, while clearing the Strait of Magellan, Carteret's vessel was separated from the others by a hurricane, and he proceeded alone, discovering Pitcairn, Gloucester and a number of other small islands. He explored the strait between New Britain and New Zealand, and drew a map of the western coast of Celebes. He returned round the Cape of Good Hope to England March 20, 1769. His long voyage added much to the geographical knowledge of his time. He retired from active service in 1794 with the rank of rear-admiral, and died at Southampton, July 21, 1796.

CARTERSVILLE, a town of Georgia, county-seat of Bartow county. Gold and copper are found in the vicinity. It is a shipping point for pig-iron and cotton.

CARTESIAN DEVIL DIVER, or BOTTLE IMP, a philosophical toy, consisting of a small hollow figure, usually in the fancied form of a demon, with a hole near the top. This figure, filled partly with air and partly with water, floats in a tall glass vessel nearly full of water, and covered with an air-tight piece of bladder or India-rubber. When this cover is pressed down, the air beneath is compressed, and water enters the floating figure until the air within is brought to an equal degree of compression. In consequence the figure sinks, not rising again till the pressure is removed.

CARTHAGE, a town of Illinois, county-seat of Hancock county, fifteen miles east of Keokuk. It is the seat of a Lutheran college and of a high school.

CARTHAGE, CAPE, a headland of North Africa, projecting into the Mediterranean. Traces of the ancient city of Carthage are found on it to the north of the Tunis lagoon.

CARTHAGE, a city and railroad center, and county-seat of Jasper county, Mo. It is located on Spring River in the midst of a rich lead-bearing section; has factories, schools, parks and a public library. In 1861 a battle was fought here on the morning of July 5, between the Confederate forces and General Siegel's army.

CARTHAGE, a railroad junction of Jefferson county, N. Y., on the Black River. Its extensive water-power is utilized in forges, foundries and manufactories, where leather, nails, furniture and machinery are made.

CARTHAGO, a ruined city of Central America, situated on a river of the same name. Down to 1841 it was the capital of Costa Rica, but being in that year destroyed by an earthquake, it was supplanted by San José. The volcano of the same name, doubtless connected with its overthrow, serves as a landmark to mariners.

CARTHAMINE, a dye obtained by a chemical process from safflower in crystals, which are insoluble in water and slightly soluble in alcohol or ether. When newly precipitated, it immediately



attaches itself to cotton or silk, dyeing it a beautiful red, which is changed to yellow on the addition of alkalis, and may be returned to red again on being treated with acids.

CARTIER, SIR GEORGE ETIENNE, BART., a Canadian statesman, born in St. Antoine, Quebec, Sept. 6, 1814, died in England, May 20, 1873. He was a lawyer who took an active part in the politics of Canada. He participated in the Lower Canada rebellion of 1837, and eleven years later was elected member of parliament. In 1857 he was attorney-general for Lower Canada, in which office he effected many reforms; he was a member the same year of Macdonald's reorganized cabinet, and of the Cartier-Macdonald ministry the following year. He was the leader of the French Canadian Conservatives in parliament.

CARTOUCH, a name once given to a wooden case containing 200 to 300 musket-balls, and eight or ten one-pound cannon balls, fired from a mortar or howitzer. The cartridge-box carried by the soldiers used to be called a cartouch in England, and still is in France.

CARTOUCHE, an oval or oblong figure on which the hieroglyphic characters and names of the Egyptian kings were sculptured. Cartouche is also used to signify a tablet either for ornament or to receive an inscription, so formed as to resemble a sheet of paper or parchment with the edges and ends rolled up. Cartouches are often seen on tombs.

CARTWRIGHT, PETER, clergyman, born in Amherst county, Va., Sept. 1, 1785, died near Pleasant Plains, Sangamon county, Ill., Sept. 25, 1872. His youth was spent in Logan county, Ky., then a region devoid of schools, churches and newspapers. Here he grew up a wild, reckless boy, but at the age of sixteen was converted, joined the Methodist Episcopal Church, was ordained to the ministry in 1803, and three years later became an elder. He became a powerful, and fearless preacher, noted for his eccentricities. A fund of ready wit added to his popularity. He was elected to the legislature of Illinois, and in 1846 was the Democratic candidate who opposed Abraham Lincoln in the contest for a seat in the U. S. Senate. He published several pamphlets, his *Controversy With the Devil* being the most famous.

CARTWRIGHT, SIR RICHARD JOHN, Canadian statesman, born in Kingston, Dec. 4, 1835. Entering parliament in 1863 as a Conservative, he became in 1870 a leader of the Liberals. He has introduced many reform motions in parliament, those bearing on the question of finance being the most important.

CARUCATE, formerly such an amount of land as one team of eight oxen could cultivate in a season. The quantity varied, averaging about one hundred acres.

CARUS, JULIUS VICTOR, a German zoölogist, born at Leipsig, Aug. 25, 1823. He studied medicine and surgery at Leipsig, subsequently at Würzburg and Freiburg, and in 1849 went to Oxford as keeper of the Museum of Comparative Anatomy. In 1851 he returned to Leipsig, and in 1853 was there placed in the chair of Comparative Anatomy. Carus lectured at Edinburgh for Wyville Thomson during his absence on the *Challenger* expedition. His writings, numerous and valuable, consist chiefly of monographs devoted to particular departments of zoölogy; the more general books are: *System der Thierischen Morphologie* (1853); *Handbuch der Zoologie* (1863); *Geschichte der Zoologie* (1872); and *Prodromus Faunæ Mediterraneæ* (1884).

CARVER, JOHN, governor of Plymouth colony, born in England about 1590, died in Plymouth,

Mass., April, 1621. He was a member of the Puritan company at Leyden, and was an agent sent to secure permission from the Virginia company to found a colony in America. Carver came over in the *Mayflower*, was elected governor by the Pilgrims while the ship was in the harbor of Provincetown, and was reelected in March, 1621, but died suddenly the following month. He ruled over the colony with much discretion.

CARY, ALICE, author, born near Cincinnati, O., April 20, 1820, died in New York city, Feb. 12, 1871. Her youth was spent where the opportunities for education and culture were very limited. At the age of 18 she began to write prose and verse for the press, and her work met with acceptance. In 1852 she removed to New York city, where she attained literary eminence. Among her published works are: *Clovermook Papers*; *Hagar: a Story of To-day*; *The Clovermook Children*; *Lyra, and Other Poems*; *Married, Not Mated*; *Pictures of Country Life*; *Lyrics and Hymns*; *The Bishop's Son*; *The Lover's Diary*; and *Snow-Berries*.

CARY, ANNIE LOUISE, singer, born in Wayne, Kennebec county, Me., Oct. 22, 1842. She graduated at the Female Seminary in Gorham, Me., in 1862, and in 1866 went to Italy for the purpose of having her voice trained by Giovanni Corsi, of Milan. She made her *début* in Italian opera in Copenhagen, and for the next few months sang in the principal European cities. In 1869, having further improved her voice by study at Baden-Baden and Paris, she came to America and sang in Steinway Hall, New York. For 12 years she sang in America with the exception of two winters (1875-76 and 1876-77) spent in Russia. In 1882 Miss Cary married Mr. Raymond, of New York, and retired from the stage.

CARY, PHEBE, author, sister of Alice Cary, born near Cincinnati, Ohio, Sept. 24, 1824, died in Newport, R. I., July 31, 1871. Her life and her literary work were closely connected with her sister's. She began to write poetry at the age of 17, one of her first poems being the hymn so widely known, commencing: "One sweetly solemn thought." As mistress of the New York home she had less leisure for writing than her sister, and she attempted but little prose. The *Poems of Alice and Phæbe Cary* are mostly the work of Alice. Phæbe's lines are more buoyant and cheerful in tone than are her sister's. Her published works are: *Poems and Parodies*; *Poems of Faith, Hope and Love*; and a number of the hymns published by Rev. Dr. Deems, in *Hymns for All Christians*. Mary Clemmer Ames Hudson, an intimate friend of the sisters, published a memorial of them.

CARY, LOTT, negro slave, born in Charles City county, Va., in 1780, died in Monrovia, Africa, Nov. 8, 1828. He educated himself, displayed remarkable business ability as shipping clerk in a Richmond tobacco warehouse, purchased his freedom and that of his two children and emigrated to Monrovia, where he became a useful and prominent member of the colony, which he served as physician, counselor and pastor. An accidental explosion caused his death.

CARY, SAMUEL FENTON, Congressman, born in Cincinnati, Ohio, Feb. 18, 1814, graduated at the Miami University in 1835, and the Cincinnati law-school in 1837, served as Independent Republican in Congress from 1867 to 1869, and was the Republican who voted against the impeachment of President Johnson. In 1876 Peter Cooper and Senator Cary were the candidates on the National Greenback ticket.

CARYATIDES, a name given to female figures in Greek architecture when applied instead of

columns to support an entablature. See *Britannica*, Vol. II, pp. 407, 461.

**CARYOCAR**, a genus of large trees of the natural order *Ternstroemiaceæ*, natives of the tropical parts of America. It yields a good timber for ship-building, and produces the delicious nuts called *butternuts*. Its flowers are large and of a purplish-red color. The fruit is a sort of drupe, the fleshy part of which consists of a butter-like substance, which is used in cookery instead of butter.

**CARYOPHYLLACEÆ**, a natural order of exogenous plants, containing upwards of 1,000 known species, mostly herbaceous, distributed all over the world. Most of them are inconspicuous weeds, but many produce beautiful flowers, and are found a favorite in many gardens, as the pink, carnations, sweet-Williams, etc. A few contain saponine, and afford a substitute for soap.

**CARYOPSIS**, in botany, a fruit in which the seed and pericarp are so incorporated as to be inseparable and even undistinguishable. The grain of the fruit of grasses, as wheat, barley, rye, maize, etc., is a caryopsis.

**CASABIANCA**, Louis (1755-98), a French naval officer, born at Bastia about 1755, sat in the National Convention of 1792, and in 1798 was captain of the flagship *L'Orient* in the expedition to Egypt. He was mortally wounded at the battle of the Nile, Aug. 1, 1798; the ship caught fire; his ten-year-old son would not leave him, and both perished in the final explosion.

**CASAMASSIMA**, a town of Italy, in the province of Bari, 14 miles southeast of the city of that name. It has a convent and two abbeys, and the vicinity produces wine and almonds. Population, 5,600.

**CASANOVA**, FRANCIS, a celebrated painter of battle-scenes and landscapes, born of Venetian parents in London in 1732, died at Briel in 1805. He was educated in Italy and took up his abode in Dresden. He afterwards went to Vienna, and painted for the Empress Catharine her victory over the Turks.

**CASAREEP**, or **CASSIRPE**, a sauce or condiment made from the juice of the bitter cassava or manioc root. It is in highest esteem in Guiana, where it is employed to flavor almost every dish. It is the basis of the favorite West Indian dish called *pepperhot*. See *Britannica*, Vol. V, p. 182.

**CASCARILLA**, a name given in South America to many different kinds of bitter medicinal barks which form articles of commerce.

**CASCO BAY**, a body of water, 20 miles long, inclosing about three hundred islands. The city of Portland, Me., is at the western end of the bay.

**CASE**, AUGUSTUS LUDLOW, rear-admiral U. S. N., born in Newburg, N. Y., Feb. 3, 1813, entered the navy as midshipman in 1828, was promoted through the several grades until 1872, when he was made rear-admiral, and in 1875 was placed on the retired list. He served during the Mexican war, the civil war, and in 1865 was appointed fleet captain of the European squadron. In 1874 the combined European, North Atlantic, and South Atlantic squadrons, which at the time of the *Virginian* difficulties were grouped in the harbor of Key West, were under his command.

**CASEMATE**, originally a loopholed gallery excavated in a bastion, through which artillery could fire upon an enemy who had gained possession of the ditch. As defense from shells became more important, the term was subsequently applied to a bomb-proof vault in a fortress for the security of the defenders, without direct reference to the annoyance of the enemy.

**CASERNE**, a barrack or building for the accommodation of the soldiers forming the garrison of a fortified town or post.

**CASEY**, LYMAN R., an American statesman of North Dakota, was born in York, N. Y., in 1837, and when young removed to Michigan, where he was in the hardware business for many years. He retired from business, traveled and studied for five years, and settled in Dakota in 1882. He is secretary and general manager of the Casey-Carrington Land Company, chairman of the North Dakota Committee on Irrigation, and has held no public office except that of commissioner of Foster county. Elected to the United States Senate as a Republican, Nov. 21, 1889, under the provisions of the act of Congress admitting North Dakota and other States into the Union, he took his seat Dec. 2, 1889. His term of service will expire March 3, 1893.

**CASEY**, SILAS (1807-82), American soldier, born at Greenwich, R. I., July 12, 1807, graduated at West Point in 1826, served on the frontier in the Florida war, in the war with Mexico and in the civil war. He drilled volunteers at the national capital, fought at Fair Oaks, and presided over the board which examined officers for colored troops. At the close of the war he was brevetted major-general U. S. A., and was retired from the service in 1868. He was the author of a book on Military Tactics.

**CASEY**, SILAS, JR., commander U. S. N., born in Rhode Island, Sept. 11, 1841, graduated at the Naval Academy in 1860, and rose successively to the positions of lieutenant, lieutenant-commander, and in 1874 commander. He took part in the first attack on Fort Sumter and in other engagements in Charleston harbor. In 1886 he commanded the receiving ship *Dale*.

**CASHIERING**, a punishment for officers in the army and navy. It is more severe than dismissal from service, inasmuch as it disqualifies from entering the public service in any capacity, while dismissal does not.

**CASIA**, or **PORT'S CASIA**, a South European shrub, *Osyris alba*, of the natural order *Santalacææ*, having small white flowers and red drupes. It has been much admired for its modest beauty. The name is varied in spelling from *Cassia*, a name to which this plant is in no respect entitled.

**CASINO** (a little house), a place for social reunions. The name is usually applied to a place where musical or dancing *soirées* are held, containing conversation room, billiard room, refreshment room, etc.

**CASOLI**, a town of Italy, in the province of Chieti, situated on a hill 17 miles south of the city of Chieti. Population, about 6,000.

**CASPARI**, KARL PAUL, a Norwegian exegete and church historian, born at Dessau in 1814, became professor of theology at Christiania in 1857. His Arabic grammar (4th ed., 1875) is in high repute, and his contributions to the study of the Old Testament include works on Obadiah, Isaiah, Micah and Daniel. Besides his *Kirchenhistorische Anekdoten* (1883), he published at Christiania *Quellen zur Geschichte des Taufsymbols und der Glaubensregel* (2 vols., 1866-69), extensions of which appeared in 1875 and 1879.

**CASSANDRA**, a peninsula in the province of Roumelia, European Turkey, situated between the Gulfs of Salonica and Cassandra. The ancient name of this headland was Pallene. Grain of a superior quality is raised here, and silk-worms are extensively reared; wool, honey and wax are also produced.

**CASSATION**, COURT OF. In the law of France, the act of annulling the decision of a court or judicial tribunal is called cassation; and the function of cassation, as regards the judgments of all the other courts, is assigned to a special tribunal called the



court of cassation, which may thus be regarded, in a certain sense, as the last and highest court of France.

CASSELL, JOHN, founder of the English publishing firm of Cassell & Co., the son of a Manchester innkeeper, born Jan. 23, 1817, died April 2, 1865. He had no early educational advantages, but fitted himself for his later work by careful self-culture while employed as an apprentice joiner. He went to London in 1836, where he was for some time established as a tea and coffee merchant. Turning his attention to literary work, he issued his "Working Man's Friend" (1750); "Illustrated Exhibitor" (1851); *Popular Educator* (1852), the most popular of all his works, which in a revised form is still on sale; and "Family Paper" (1853). In 1859 he entered into partnership with Messrs. Petter & Galpin, and before his death he shared in the prosperity of one of the largest publishing houses of modern times.

CASSELL, PAUL, a German author and divine, born in Silesia in 1827. He was a Jew, but became a Christian in 1855, while engaged in literary work at Erfurt. He became a member of the Prussian parliament in 1866, but soon renounced politics for theology. His writings are mostly historical and Biblical.

CASSELLTON, a thriving town of North Dakota, situated in the fertile wheat producing valley of the Red River of the North, about 25 miles west of Fargo.

CASSICAN, a bird of the genus *Cassicus*, allied to the starling and more closely to the hangnests. They are all American birds of gregarious habits, feeding on fruit and insects and exhibiting surprising skill in the construction of their pouch-like nests.

CASSIDARIA, a genus of gastropod mollusks, family *Cassidae*. The shell is roughly oval, with a wide mouth, a fairly long siphon canal, and without a closing lid. There are six modern Mediterranean species, and five times as many extinct in the Upper Chalk and Tertiary strata.

CASSIDY, WILLIAM, journalist, born in Albany, N. Y., Aug. 12, 1815, died there Jan. 23, 1873. He was a graduate of Union College in 1834; studied law and was admitted to the bar, and in 1840-42 was State Librarian. In 1843 he became editor of the Albany "Atlas," a Democratic daily. In 1856 the "Atlas" and "Argus" were consolidated, and he became editor.

In 1865 the paper was called the "Argus." Mr. Cassidy from 1868 till 1873 was secretary of the Democratic State committee, and framed the celebrated anti-slavery plank which suffered defeat at the convention at Herkimer. In 1872 Governor Hoffman appointed him as one of a committee of 16 to revise the constitution.

CASSIOPEIA, a beautiful constellation of the Northern hemisphere, supposed to represent the wife of Cepheus sitting in a chair with a branch in her hand. In 1572 there appeared in this constellation a new star, which was brighter than Venus. The star gradually diminished in luster, and in March, 1574, it disappeared.

CASSIQUIARE, a river of Venezuela, South America. It is about 100 yards in breadth, which gradually increases until at its union with the Rio Negro it attains a width of 600 yards. By means of this singular river water communication is established through the Amazon, Orinoco, and their affluents, between the interior of Brazil and the Caracas in Venezuela.

CASSIS, a French liquor prepared from black currants.

CASSIUS, PURPLE OF, a coloring substance of very ancient use, which is prepared by adding a

mixed solution of protochloride and bichloride of tin gradually to a solution of chloride of gold, when a more or less abundant precipitate of double stannate of gold and tin is thrown down. Purple of cassius is employed by the potter to communicate a rich purple or rose tint to fine china, and it also imparts the red color to *Bohemian glass*.

CASSOCK, a long, loose coat, worn by the Episcopal and Catholic clergy. It has a single upright collar, and reaches to the feet. Its common color is black for all orders of the clergy. In the Anglican church, on state occasions, the bishops frequently wear purple. In the Roman Catholic church cassocks vary in color according to the dignity of the wearer, priests wearing black, bishops purple, cardinals scarlet, and the pope white.

CASSOPOLIS, a village of Michigan, county-seat of Cass county. It contains manufactories of lumber, iron, sash, blinds, and furniture.

CAST, CASTING LINE, in angling, a gut-line on which artificial flies are fastened. It is made up of several lengths of gut, knotted together, from two to four yards long. The flies are attached at intervals of about two feet, and the line with its flies is called a *cast*.

CASTANET, a musical instrument of percussion in form of two hollow nut-shells, which are bound together by a band, slung over the thumb and struck by the fingers to produce a thrilling sound in keeping with the rhythm of the music. Castanets were introduced into Spain by the Moors, where they retain the name of castanulas, from their resemblance to the form of the chestnut. They are now widely introduced among other nations, with some variations in form, and are used in the ballet and in the opera.

CASTEGGIO, a town of Piedmont, Northern Italy, five miles northeast of Voghera. It was an important military position as early as the times of the Gallic and Punic wars. Some Roman antiquities still remain, and numerous curious inscriptions and coins have been found. Population, 3,200.

CASTELAR, EMILIO, an eminent Spanish statesman and orator, born in 1832. He joined the revolutionary Republicans in 1868, and, being condemned to death, fled to France. On the abdication of King Amadeo he became minister for foreign affairs, and afterwards President of the Cortes, and President of the Republic in 1873. Since the restoration of monarchy he has devoted himself more to literary pursuits than to politics.

CASTELLAMONTÉ, a town of Northern Italy, in the province of Turin, 10 miles southwest of Ivrea. It has an old castle, manufactories of earthenware, and a trade in the agricultural produce of the district. Population, 5,660.

CASTELLAN, or CHATELAIN, a name given during the Middle Ages to the keeper of a castle, or *burg*.

CASTELLANA, a town of Italy, in the province of Bari, 25 miles southeast of the city of that name. Population, 9,700.

CASTELLANETA, a town of South Italy, in the province of Lecce. It has several convents and a cathedral. Cotton is grown in the district. Population, 7,600.

CASTELLEZZO, a town of North Italy, about five miles southwest of Alessandria. Population, 6,500.

CASTELLEONÉ, a town of Lombardy, North Italy, situated near the Oglio. It is surrounded by old walls, and has a population of about 6,000.

CASTELLIO, SEBASTIEN, a French theologian, born at Dauphiné in 1515. About 1540 he was invited to Geneva by Calvin, and appointed Humanity Professor, but having the misfortune afterwards to differ from the Reformer in religious opinion, he

was banished from the city, and went to Basel, where he spent the rest of his life in extreme poverty. Among his various writings may be mentioned *De Hæreticis*, etc., a treatise which argues against the right of the magistrate to punish heretical opinions; a Latin version of the Old and New Testaments; and a posthumous work, in dialogue, on predestination, election, free-will and faith.

**CASTELNUOVO**, a seaport town of Dalmatia, Austria, situated near the western entrance of the Gulf of Cattaro. It is surrounded by walls, and defended by two forts and a citadel. It has manufacturing of brass, and a trade in the produce of the district, which is fertile. Population, 7,000.

**CASTIGLIONE**, LAKE OF, a lagoon of Tuscany, in the province of Siena. It lies to the north of Grosseto, and has a length of about 10 miles, with a breadth of one to three miles. Receiving the waters of the Bruna and other rivers, it discharges its waters by a short canal into the Mediterranean.

**CASTILLA**, RAMON, a Peruvian soldier, born in Tarapacá, Aug. 30, 1797, died in Tiviliche, May 25, 1867. He was brigadier-general of the army of Peru in 1834; was engaged in several insurrections; overthrew the government of Vivanco, and became president of Peru from 1845 to 1851; overcame his successor and ruled from 1854 to 1862, during which period he abolished slavery and other abuses, but allowed corruption, and after laying down his authority in 1862 was in 1867, the year of his death, again engaged in insurrection against the Peruvian ruler.

**CASTILLON**, a town of France in the department of Gironde, situated on the right bank of the Dordogne, 26 miles east of Bordeaux. It has manufacturing of cotton and woolen yarns, nails and cordage. Population, about 4,000.

**CASTINE**, a town of Maine, situated on the east side of Penobscot Bay, at the mouth of the Penobscot River. It is a port of entry, has an excellent harbor, and is chiefly engaged in ship-building and in the manufacture of cordage, brick and furniture. It is the seat of a State normal school.

**CASTING-VOTE**, the decisive vote of a presiding officer, when the votes cast by the members of the assembly or house are equally divided. All the officers of a deliberative body are ordinarily members of the assembly, and as such are entitled to participate in the proceedings. The presiding officer does not usually engage in the debate, and votes only when the assembly is equally divided. In some legislative bodies, the presiding officer is not a member; as, for example, in the Senate of the United States; the Senate of New York, and in some other States. The Speaker of the House of Representatives is a member of that body; but the presiding officer of the Senate is not a member of the Senate. The Constitution specially provides that the Vice-President of the United States shall be President of the Senate, but shall have no vote unless the members are equally divided. The same rule is held with reference to the Speaker of the British House of Commons. Neither of these presiding officers are members of the body over which they preside, yet each one holds under the Constitution the casting-vote when there is a tie. If the presiding officer be a member of the body, he may give the casting vote, although he has, by already voting as a member created the tie. Under British parliamentary usage, the governor, in the time of Hastings, had only one vote in council, and in case of an equal division a casting vote, thus seeming to grant him under the exception a double vote.

**CASTLE**, **FREDERICK ALBERT**, physician, born in Fabius, N. Y., April 29, 1842. He studied at the

Albany Medical College, made a good record as surgeon in the navy, graduated from Bellevue Hospital Medical College in 1866, settled in New York city, where he is known as a lecturer on the diseases of women and children, the author of medical papers, and the editor of the "American Druggist."

**CASTLEFORD**, a town in the West Riding of Yorkshire, on the Aire, 10 miles southeast of Leeds. It was formerly a Roman station, and is now the seat of extensive glass-works, manufacturing especially large quantities of bottles. Population, 10,530.

**CASTLEMAINE**, a town of Victoria, 77 miles northwest of Melbourne by rail. The gold diggings here were among the first discovered in Australia. Population, 5,787.

**CASTLE ROCK**, a town of Colorado, county-seat of Douglas County, situated near the famous castle rock, about 30 miles south of Denver. The chief industries are dairying and cattle raising.

**CASTLES**, in heraldry, are often given as charges in the shields of persons who have reduced, or been the first to mount, the walls of a castle in an assault.

**CASTLETON**, a village of Rutland county, Vt., on Castleton River. A railroad passes through the place. There is here a State normal school, and also manufactories of marbelized slate and agricultural implements.

**CASTOREUM**, a substance secreted in two glandular sacs in the beaver, and at one time held in the highest repute in medicine, but now chiefly used by perfumers.

**CASTRAMETATION**, the art of encamping; and a camp is the result of that art.

**CASTRI**, a village of modern Greece, in the government of Phocis, situated on the south declivity of Mount Parnassus, and worthy of notice, as occupying a portion of the site of the ancient Delphi. The famous Castalian spring, now called the Fountain of St. John, is situated between 200 and 300 yards to the east of the village.

**CASTRO**, **JUAN**, the assumed name of a Cuban poet, who was born near Matanzas in 1790, of slave parents, but learned to read and write, and developed marked poetical genius. Some gentlemen purchased his freedom and assisted him in publishing his poems. He published an autobiography, which vividly portrays slave-life in Cuba. The finest of his poems, which are in Spanish, is entitled *The Clock That Gains*.

**CASTRO**, a seaport town of Asiatic Turkey, capital of the island of Mitylene, situated on the east coast, about 55 miles northwest of Smyrna. It is surrounded with walls and defended by a castle. Population, 6,500.

**CASTUERA**, a town of Estremadura, Spain, 68 miles southeast of Badajoz. It is situated on the right bank of the Guadalefra, and has manufacturing of brick, earthenware, etc., and a trade in agricultural products. Population, 5,690.

**CASUAL POOR**, persons temporarily relieved without being admitted to the roll of permanent paupers.

**CASUARINA**, a genus of trees of the natural order *Amentaceæ*, and of the sub-order *Casuarinææ*. The trees are almost exclusively Australian, having a very peculiar appearance, their branches being long, slender, wiry, drooping and green, jointed with very small scale-like sheaths instead of leaves. They resemble arborescent *Equisetaceæ*. Some of the trees are large and produce timber of excellent quality, often called *beef-wood* from its resemblance in color to raw beef.

**CASUS BELLI**, or a cause of war, the reason alleged by one power for going to war with another.



It is found impossible to reduce these causes or reasons to any definite code, because an ambitious or aggressive power has no difficulty in making a reason to declare to others without acknowledging the real ground.

CASWELL, ALEXIS, educator, born in Taunton, Mass., Jan. 25, 1799, died in Providence, R. I., Jan. 8, 1877. He was at the head of the class which graduated at Brown University in 1822. The following year he became an instructor in Columbian University, remaining four years, and then becoming pastor of a Baptist church in Halifax, N. S., having pursued theological studies during his teaching. He taught for a year in Waterville College, was called in 1828 to the First Baptist church of Providence, R. I., and about this time was called to the chair of Mathematics and Natural Philosophy at Brown University. This he occupied for 35 years, resigning in 1863, but was chosen to serve as president of the University five years later, and held this position four years. He founded the alumni association, was connected with Newton theological institution, president of the Baptist Missionary Union for two years, a trustee and for two years the president of the Rhode Island Hospital, and connected with various other literary and scientific associations.

CASWELL, RICHARD, soldier, born in Maryland, Aug. 3, 1729, died in Fayetteville, N. C., Nov. 20, 1789. He was a member of the legal profession; was in the colonial assembly from 1754 to 1771; a delegate to Congress (1774-75); governor of North Carolina from 1777 to 1779; and was engaged in the war of the Revolution, reaching the rank of major-general. He became comptroller-general in 1782, governor from 1784 to 1786, Senator in 1789, and member and presiding officer of the convention which ratified the Federal Constitution in 1789.

CAT, on shipboard, a name for many of the ropes or lines employed. A *cat-fall* is a rope for heaving up the anchor from the water's level to the bow; it works through *cat-blocks*, and is connected with the *cat-head*. *Cat-harpings* are small ropes for tightening the shrouds.

CAT, or CAT-CASTLE, in the military engineering of the Middle Ages, a kind of movable tower to cover the sappers as they advanced to a besieged place. The garrison sometimes poured down burning pitch and boiling oil from the walls upon the *cat*.

CATABROSA, a genus of grasses formerly included in *Aira*. *Catabrosa aquatica* grows in very moist situations, and is only cultivated in irrigated meadows or on the banks of rivers subject to be overflowed by high tides. Its foliage is peculiarly sweet and much relished by cattle. Its foliage and seeds also afford much food to water-fowl and to some kinds of fish, particularly carp. Its leaves often float, and its stalks seldom rise more than a foot or 15 inches above the surface of the water. It abounds throughout Europe and in the torrid regions of South America.

CATACLYSMAL ACTION, a term applied by geologists to the effects of certain deluges, or other sudden and violent physical action of great extent, supposed to have swept over certain countries. In this way they account for various phenomena which cannot be attributed to the gradual action of ice or that of moderate currents.

CATAFALCO, or CATAFALQUE, a temporary structure of carpentry, intended to represent a tomb or cenotaph, and adorned with sculpture and painting. It was employed in funeral ceremonies. The most magnificent catafalco ever made was that used at the interment of Michel Angelo at Florence.

CATALANI, ANGELICA (1780-1849), a highly celebrated Italian singer, born at Sinigaglia in 1780, and educated in the convent of St. Lucien, near Rome. She made her first public appearance at Venice in her 16th year, and experienced a succession of triumphs in every country in Europe for more than 30 years. In 1830 she purchased a villa in Florence, where she gave free instructions to girls who had a talent for singing. In 1849 she repaired with her two daughters to Paris, where she died of cholera on the 13th of June.

CATALAUNIAN, the ancient name of the wide plain surrounding Chalons-sur-Marne, in the old province of Champagne, France, celebrated as the field of battle where the West-Goths and the forces under the Roman general Aëtius gained a victory over Attila, A. D. 451. A wild tradition tells that three days after the fight the ghosts of the fallen myriads appeared on the plain, and renewed the conflict.

CATALDO, SAN, a town of Sicily, in the province of Caltanissetta, five miles west of the town of that name. There are productive sulphur mines in its vicinity. Population, 10,000.

CATALPA, a genus of hardy trees, order *Bignoniaceæ*, of which two species, *C. bignonioides* and *C. speciosa*, are natives of the United States, and are common in cultivation as ornamental trees. The *catpalpa* has large simple leaves, terminal panicles of showy flowers, and long pods with winged seeds. Its wood is light and soft, but exceedingly durable, and is used for fence-posts, railway sleepers, etc. *C. longissima* of the West Indies yields excellent timber known as French oak, and the bark is a source of tannin. The Japanese *catpalpas* are small and unimportant.

CATALYSIS, a term applied in chemical physics to a force supposed to be exerted by one substance upon a second, whereby the latter is subjected to change or decomposition, while the former, or acting substance, remains comparatively unaltered, and does not combine with it.

CATAMARAN is a raft formed of three planks lashed together, the middle one serving as a keel, and the other two for the sides. These simple vessels are used by the natives of Madras to maintain communication between ships and the shore, ordinary boats being rendered unsafe by the surf. By the adoption of a similar construction on a larger scale, some of the catamarans are made large and strong enough to carry goods, and even artillery. Catamarans are also used along the sea shore of the West Indies, and on the coasts of South America.

CATAPLASM, an application to diseased or painful parts, for the purpose of promoting suppuration, relieving pain, and stimulating or soothing the skin according to circumstances. A cataplasm may be composed of any moist pulpy substance of sufficient consistence to retain the water without soaking through the thin muslin covering in which it is wrapped. The flaxseed poultice is the most easily made, and is the most satisfactory of all soothing applications.

CATARRHINA, a division of quadrumanous mammals, including those old-world monkeys and apes which have the nostrils close together and turned downward. This section includes the Barbary ape, gorilla, chimpanzee, orang, etc.

CATASAUQUA, a railroad town of Lehigh county, Pa., situated on the Lehigh River. It contains blast-furnaces, rolling-mills, machine-shops and manufacturing of fire-brick and railroad cars.

CATAWBA, or GREAT CATAWBA, a river of North Carolina, 250 miles in length. It rises in McDowell county, flows eastward, enters South Carolina at

Rocky Mount, below which place it is called the Wateree River.

**CATCHFLY**, a common name of several plants of the natural order *Caryophyllaceæ*, which, being clammy in consequence of a peculiar exudation on the calyx, on the joints of the stem, etc., often prove fatal to insects settling upon them.

**CATCHPOLE**, in England, a sheriff's officer or bailiff, whose duty it is to make arrests. In various places a long pole was in use for catching or holding criminals by the neck, having at the end of it an iron collar with a V-shaped opening, occasionally armed with spikes on the inside.

**CATE**, WILLIAM H., of Jonesborough, Ark., a lawyer and planter, born in Rutherford county, Tenn., Nov. 11, 1839. He graduated from the University at Knoxville, Tenn., in 1857; was a teacher in the West and South, and served in the Confederate army during the war of the Rebellion. He settled at Jonesborough, Ark., in 1865, and entered the profession of law in 1866. In politics he was a Democrat, and was elected a member of the State legislatures of 1871 and 1873. He was prosecuting attorney of the second circuit in 1878, and elected judge of that circuit in 1884. He was declared elected a Democratic Representative from the First Congressional District of Arkansas to the 51st Congress, but the House of Representatives decided that he was not entitled to the seat. He was elected from the same district to the 52d Congress in 1890.

**CATENIPORA**, or **HALYSITES**, a genus of fossil lamelliferous corals peculiar to Palæozoic strata. The cells are terminal and oval, arranged like a loose net-work of chains, hence called "chain coral." Vertical anastomosing lamellæ united the cells together, and formed a hemispherical polypidom, sometimes of great size.

**CATERINA**, SANTA, a town of Sicily in the province of Caltanisetta, situated on a hill near the river Salso. It has manufactories of fine earthenware, and in the neighborhood are found jaspers and agates. Population, about 6,000.

**CATESBY**, MARK, naturalist, born about 1679, in London, died there Dec. 23, 1749. He traveled in North America from 1710 to 1719, and from 1722 to 1726, and published *Natural History of Carolina, Florida and the Bahama Islands* (2 vols., 1731-43); *Hortus Bratanno-Americanus*; and a work on the fishes, reptiles and insects of the Isle of Providence.

**CATESBY** ROBERT (1573-1605), a Northamptonshire Catholic, born in 1573, of good fortune and lineage, being sixth in descent from Richard III's Catesby, who was hanged three days after Bosworth. Robert, however, had suffered much as a recusant both by fines and imprisonment, when in 1604 he engaged in the gunpowder plot. He was killed in the defense of Holbeache House, Nov. 8, 1605.

**CATHA**, a genus of plants belonging to the natural order *Celastraceæ*, chiefly natives of Africa. *C. edulis*, the *khat* or *kafta* of the Arabs, is a shrub highly valued by them, as its leaves and twigs are used in the preparation of a beverage possessing properties analogous to those of tea and coffee.

**CATHARTICS**, a name originally for all medicines supposed to purify the system from the matter of disease, which was generally presumed by the ancients to exist in all cases of fever and acute diseases and to require to be separated or thrown off by the different excretions of the body. The principal cathartics are aloes, colocynth, rhubarb, scammony, jalap, senna, epsom and other salts.

**CATHARTIDÆ**. See **VULTURE**, *Britannica*, Vol. XXIV, pp. 301, 302. See also under **BIRDS**, *Britannica*, Vol. III, pp. 699-778.

**CATHARTINE**, or **BITTER OF SENNA**, the essential principle in senna, which possesses laxative or purgative properties. It can be isolated as a yellowish-red uncrystallizable solid, which is deliquescent, soluble in water and alcohol, but insoluble in ether. It has a very bitter nauseous taste, and a characteristic odor.

**CATHCART**, WILLIAM SCHAW, first Earl Cathcart, a British general and diplomatist, son of the ninth Baron Cathcart of Cathcart, Renfrewshire, born Sept. 17, 1755, died June 17, 1843. He was educated at Eton and Glasgow, and admitted an advocate in 1773. He entered the army in 1774, took a prominent part in the American war, and fought with distinction in Flanders and North Germany. In 1803 he was made commander-in-chief in Ireland. In 1807 he commanded the land forces coöperating with the fleet in the attack on Copenhagen, and for his services was made a British peer, with the title of viscount, and received a vote of thanks from both Houses of Parliament. In 1814 he was raised to the rank of earl.

**CATHELINEAU**, JACQUES, general of the army in La Vendée in the west of France. He was born at Pin-en-Mauges in 1759, died at St. Florent in 1793. Horrified at the atrocities and despotic acts of the Convention, he placed himself in opposition to it and soon collected around him a body of loyal peasantry, whom he led against and defeated the Republicans in several conflicts. After the victory of Saumur he was appointed commander-in-chief. He died from the effect of a wound received while making an attack upon Nantes.

**CATHETER**, a name applied to a tubular instrument introduced through the urethra into the bladder to draw off the urine when its discharge is arrested by disease or accident, and also to those used for injecting air or fluids into the Eustachian tube. The Eustachian catheter is generally made of metal or vulcanite, six or seven inches in length with the last inch or less slightly curved. It is introduced into the Eustachian tube along the floor of the nose, and air or fluid, as may be necessary, forced along it by an India-rubber bag, which can be attached to it.

**CATHOLICOS**, the title of the patriarchs or chief ecclesiastics in the hierarchy of the Armenian church.

**CATKIN**, in botany, a spike of numerous small unisexual flowers, destitute of calyx and corolla, and furnished with scale-like bracts instead. Examples are found in the willow, oak, alder, birch, etc.

**CATLETTSBURG**, the county seat of Boyd county, Ky., located at a railroad junction on the Ohio River, at the mouth of the Big Sandy. A State normal school is located here, and the town has a large lumber trade and several manufactories.

**CATMINT**, or **CATNIP** (*Nepeta cataria*), a plant of the natural order *Labiata*, widely diffused throughout Europe, Asia and North America. It has erect stems, two or three feet high, dense whorls of many whitish flowers, and stalked heart-shaped, velvety leaves, whitish and downy beneath, and its fragrance is very attractive to cats.

**CATOPTICS**, that division of geometrical optics which treats of the phenomena of light incident upon the surfaces of bodies, and reflected therefrom.

**CATOPROMANCY**, a divination practiced by the ancients. It was generally believed that the healthy appearance of a sick person's face in a mirror under water betokened recovery, while a ghastly look indicated certain death. A more modern superstition attached to the looking-glass is that ill-luck will result from the breaking of one.

**CATRON**, JOHN, jurist, born in Wythe county, Va., in 1778, died in Nashville, Tenn., May 30, 1865.



He practiced law in Tennessee; served under Gen. Jackson in the war of 1812; was elected State attorney; chosen a Supreme Court judge, and was chief justice from 1830 to 1836. In 1837 he became associate justice of the United States Supreme Court, retaining the office up to his death. Judge Catron was a Democrat, a fervent Unionist, and for his opinions on secession was for a time compelled to leave the State.

CATSKILL, a village of New York, county-seat of Greene county, situated on the right bank of the Hudson, 35 miles below Albany. It is the seat of an academy, and contains a variety of manufactures, including woolen goods and paper. In the vicinity are a number of stone-yards and large ice-houses.

CATELL, ALEXANDER GILMORE, Senator, born in Salem, N. J., Feb. 12, 1816. He was elected to the legislature in 1840; to the United States Senate in 1866; served for two years as a civil service commissioner, being on the first commission ever appointed; was financial agent to London for the government (1873-74); and was engaged in important financial transactions.

CATELL, WILLIAM CASSIDY, educator, born in Salem, N. J., Aug. 30, 1827. He graduated at Princeton College and Theological Seminary, became professor of Latin and Greek in Lafayette College in 1860, and for three years was pastor of the Pine Street Presbyterian Church at Harrisburg, Pa. In 1863 he became president of Lafayette College, in which capacity he made extensive improvements. He was a director of Princeton Theological Seminary, and at the present time (1891) is corresponding secretary of the Presbyterian Board of Ministerial Relief.

CAUB, a town of Nassau, North Germany, on the right bank of the Rhine, 21 miles northwest of Weisbaden. It has underground slate quarries. It is celebrated as the place where Blucher crossed the Rhine with his army in 1814.

CAUCHON, JOSEPH EDWARD, Canadian author, born in St. Rochs, Quebec, Dec. 31, 1816, died in Whitewood, Northwest Territory, Feb. 23, 1885. He founded in 1842 "Le Journal de Québec," which he conducted until his death. From 1844 till 1867 he represented the county of Montmorency in the Canadian assembly. Under the MacNab-Taché administration he held for two years the office of commissioner to the crown, and was at the same time member of the Executive Council. During the Cartier-Macdonald régime Mr. Cauchon was commissioner of public works. He was speaker of the Senate from 1867 to 1872; president of the Privy Council of Canada from 1875 to 1877, and minister of inland revenue till 1877, at which time he became governor of Manitoba.

CAUCHY, AUGUSTIN LOUIS, mathematician, born in Paris, Aug. 21, 1789, died May 23, 1857. He published in 1815 a *Mémoire sur la Théorie des Ondes*, which was afterwards made the basis of the undulatory theory of light. Between 1820 and 1830 he wrote several important treatises. From 1848 to 1852 he was professor of astronomy at Paris, but refused the oath of allegiance to Napoleon III, and subsequently lived in retirement.

CAUDA-GALLIA GRIT, the lowest sub-division of the Devonian system of North America. The name (literally, "cock's tail") is derived from the feathery forms of a common fossil, supposed to be a seaweed.

CAUDEBEC-LES-ELBEUF, a town of France in the department Seine-Inferieure, 12 miles south of Rouen. It has manufactories of cloth. Population, 10,700. Caudebec is also the name of a town in the same department, situated on the right bank

of the Seine, 26 miles east of Havre. It manufactures cotton, sail-cloth, leather, and soap. Population, 2,100.

CAULAINCOURT, ARMAND AUGUSTIN LOUIS DE, Duke of Vicenza, a French statesman, born at Caulaincourt in 1772, died at Paris in 1827. He entered the army at the age of 15, rapidly attained promotion, and as colonel of a regiment of carabiniers distinguished himself in the campaign of 1800. He was made a general of division in 1805, and shortly after created Duke of Vicenza. In 1807 he was appointed ambassador at St. Petersburg. Disputes having arisen between Alexander and Napoleon, Caulaincourt endeavored to restore amity and prevent war; but his proposals being rejected, he resigned his post in 1811, and accepted an appointment in the army of Spain. He was made minister for foreign affairs, and in this capacity attended the congress at Chatillon in 1814.

CAULOPTERIS, a generic name for the stems of fossil tree-ferns found in the Carboniferous and Triassic measures. They are hollow and covered with markings similar to the leaf-scars on recent tree-ferns.

CAURA, a considerable river of Venezuela in Guyana. It rises among the Sierras of the southern frontier, and flows northwest to the Orinoco. Length, about 150 miles.

CAUS, CAULX, or CAULS, SALOMON DE, French engineer, born at Dieppe in 1576, died in Paris, June 6, 1626. He spent the greater part of his life in England and Germany. He was in the service of the Prince of Wales in 1612, and of the elector palatine at Heidelberg from 1614 to 1620. Returning to France in 1623, he became engineer and architect to the king. His *Raisons des Forces Mouyantes*, etc., published at Frankfort in 1615, contained a description of an apparatus for forcing up water by a steam fountain, differing only in one detail from that of Della Porta. There is no reason to suppose that the apparatus was ever constructed; but, on the strength of the description, Arago has claimed for De Caus the invention of the steam-engine.

CAUSATION, the act of causing or producing; the act or agency by which an effect is produced.

CAUSE CÉLÈBRE, a convenient French term for a specially interesting and important legal trial, criminal or civil, such as the Douglas cause (1769-71), the Dred Scott case in the United States (1856), the Tichborne case (1871-74). There is a great French collection of *Causes Célèbres et intéressantes* (22 vols., 1737-45), by Gayot de Pitaval, with modern continuations.

CAUSERIE, a name applied to a somewhat short and informal essay on any subject in a newspaper or magazine. More familiar in manner and slighter in structure than the formal essay as usually understood, it is an excellent medium for a writer whose personality interests the reader as much as the value of his thoughts. The name owes its literary currency mainly to the famous *Causeries du Lundi* of Sainte-Beuve.

CAUSTIC, in medicine and in chemistry, the term applied to such substances as exert a corroding or disintegrating action on the skin and flesh. Lunar caustic is nitrate of silver, and common caustic is potash. When used as a caustic in medicine, the substance is fused and cast into moulds, which yield the caustic in small sticks the thickness of an ordinary lead pencil.

CAUTERETS, a fashionable French watering-place in the department of Hautes-Pyrenees, situated 3,250 feet above sea-level in the valley of the Lavedan, 42 miles southeast of Pau. The

permanent population is less than 2,000; but it is annually swelled in summer by 15,000 to 20,000 visitors, for whose accommodation numerous sumptuous hotels and bathing establishments have been built. It is a good center and guide-station for ascents among the Pyrenees. The sulphur springs, twenty-five in number, have been known from Roman times, though their modern reputation dates from the 16th century, when Margaret, sister of Francis I, held her literary court and wrote much of her *Heptameron* at Cauterets.

**CAUTERY**, in medicine, a term used of any substance which burns the tissues. The *actual cautery* is an instrument with a head or blade of steel, iron or platinum, which is heated in a fire or spirit-lamp. In the *thermo-cautery* (or Paquelin's cautery, from its inventor), the head or blade is made of hollow platinum, so arranged that a flame of benzole can be kept burning in its interior. The *galvano-cautery* consists essentially of a platinum wire, which can be heated to any required degree by passing a strong galvanic current through it.

**CAUTION**, in the law of Scotland, an obligation undertaken by a second party, whereby he binds himself, failing the primary obligant, to fulfill his obligation, whether it be of a pecuniary nature or otherwise. Cautionary obligations are thus essentially of an accessory nature, and cannot subsist apart from the principal obligation. Cautionary obligations are generally gratuitous, being for the most part undertaken from motives of friendship; but it is by no means uncommon for them to be entered into in consideration of a premium paid by the person guaranteed or by those interested in his fortunes. Judicial caution, in the law of Scotland, is of two kinds—for appearance, and for payment. If a creditor makes oath before a magistrate that he believes his debtor to be meditating flight, he may obtain a warrant for his apprehension; and should he succeed in proving the alleged intention to flee, he may compel him to find caution to abide the judgment of a court. The cautioner, or surety, undertakes that the defender shall appear to answer any action that may be brought within six months. There is also a form of judicial caution called *judicatum solvi*, given in cases of general loosing or arrestment of ships, in which the surety becomes liable for the whole debt.

**CAUVERIPURAM**, a town of the district of Coimbatore in the presidency of Madras, on the right bank of the Cauvery. It takes its name from the neighboring gorge of 30 miles in length, through the Eastern Ghats, along which the Cauvery finds a passage.

**CAVA DEL TIRRENI**, a town of Italy, situated in a valley, five and one-half miles northwest of Salerno by rail. It has manufactories of silk, woollens, cotton and linen. Population, 6,399. About a mile distant is the Benedictine monastery of the Trinity, celebrated for its archives.

**CAVALCASELLE**, GIOVANNI BATTISTA, Italian art writer, born at Legnago, Jan. 22, 1820, early visited the art-centers of Italy, and in 1846 went to Germany, where he met J. A. Crowe, with whom he returned to Italy. Banished for his share in the revolution of 1848, he accompanied Crowe to London, where their first joint work, *Early Flemish Painters* (1857; 3d edition, 1879), was published. Cavalcaselle returned to Italy in 1858, and in 1861 commenced with Crowe the *History of Painting in Italy* (London, five volumes, 1864-71). Other joint works are *Titian* (1876) and *Raphael* (1883). Cavalcaselle is head of the art department in the ministry of Public Instruction at Rome.

**CAVALIER**, in fortification, is a defense work constructed on the *terre-plein* or level ground of the

bastion. Its uses are to command any rising ground held by the enemy within cannon shot.

**CAVALIER**, a horseman; a knight. In 1641 the term "cavaliers" was applied to the Partisans of Charles I of England, in opposition to the Roundheads, or friends of the Parliament; and from a term of reproach it came later to be adopted as a title of honor, until, after 1679, it was superseded by "Tory."

**CAVALLER-MAGGIORE**, a town of North Italy, in the province of Cuneo, 24 miles northeast of Coni. Population, 5,300.

**CAVALRY**. See *Britannica*, Vol. V, pp. 261-63.

**CAVATINA**, a short form of operatic air, of a soft character, differing from the ordinary aria in consisting only in one part. The term is applied, however, to airs of any kind.

**CAVEAT**, a formal warning, entered in the books of a court or a public office, that no step shall be taken in a particular matter without notice to the person lodging the caveat, so that he may appear and object. Thus caveats are frequently entered at the Patent Office to prevent the unopposed granting of letters-patent.

**CAVE SPRING**, a railroad village of Floyd county, Ga. It has a large cave and a mineral spring, has a State asylum for deaf-mutes, and the Harn School for young men.

**CAVY**. See *Britannica*, Vol. V, p. 277.

**CAWDOR**, a village in Nairnshire, Scotland, five and one-half miles southwest of Nairn. Cawdor Castle, near by, is the seat of the Earl of Cawdor. It was founded in 1454, but is one of the three places which tradition has assigned as the scene of King Duncan's murder by Macbeth in 1040.

**CAWK**, a popular name for a massive variety of the mineral called *Heavy Spar*, or *Sulphate of Baryta*.

**CAWKER CITY**, a thriving town of Mitchell county, Kan., at the junction of two branches of Solomon River. It has a flour-mill, newspaper office, a high school, and United States land office.

**CAXAMARQUILLA**, a town in North Peru, province of Patatz, situated on the east bank of the Maranon. Population, 8,000.

**CAYES**, or **AUX-CAYES**, a seaport of Hayti, on the southwest coast, 95 miles southwest of Port-au-Prince. Population, 8,000.

**CAYLEY**, ARTHUR, English mathematician, born at Surrey in 1821. He was educated at King's College, London, and Trinity College, Cambridge, and graduated as senior wrangler, and first Smith's prizeman in 1842. Called to the bar at Lincoln's Inn in 1849, he was for a time established in business as a conveyancer. In 1863 he was elected first Sadlerian Professor of Pure Mathematics at Cambridge, and in 1875 was elected to a fellowship of Trinity College; was President of the Royal Astronomical Society (1872-73), and of the British Association at its Southport meeting in 1883, where his address on the ultimate possibilities of mathematics attracted much attention. In 1882 he gave a course of mathematical lectures at the Johns Hopkins University, Baltimore, and in the same year received the Copley medal of the Royal Society. He has received honorary degrees from Oxford, Dublin, and Leyden. His chief book is an *Elementary Treatise on Elliptic Functions* (1876); a 10-volume edition of his mathematical papers was begun in 1889.

**CAYUGA**, a village of New York, situated on the eastern shore of Cayuga Lake, which is here crossed by a railroad bridge about a mile long.

**CAYUGA LAKE**, a beautiful small sheet of water, which separates Cayuga and Seneca counties, N. Y. It is 38 miles long, from one to three miles wide, its greatest depth being 500 feet.



**CAYUGAS.** See **INDIANS, AMERICAN**, in these Revisions and Additions.

**CAZENOVIA**, an educational village of Madison county, N. Y., situated on a small lake 18 miles southwest of Syracuse. It has some manufactories, and is the seat of Central New York Conference Seminary.

**CEBALLOS**, José, Mexican soldier, born in the city of Durango, March 15, 1830. He commanded a regiment in the national army of Mexico during the administration of President Juárez, and was appointed brigadier-general; waged war on the bandit Losada; deposed, according to military orders, Camarena, governor of Jalisco, and then ruled over that State. When General Díaz became Mexican president, Ceballos plotted against him, but afterwards became one of his strong adherents, and returned to Mexico, where he was restored to rank, given the highest office after that of president—the governorship of the federal district—and chosen as senator. He manifested great enmity toward the newspapers, and several journalists have suffered imprisonment through his orders.

**CECROPIA**, a genus of *Artocarpaceæ* *C. peltata*, the trumpet-tree of the West Indies and South America; has a hollow stem and branches, exhibiting merely membranous partitions at the nodes. The branches, these partitions being removed, are made into water-pipes and wind instruments. The wood is very light and is used to make floats for nets, and by the Indians in kindling fires by friction against a harder piece of wood. The best yields a cordage fiber, and the outer bark is astringent; the fruit resembles a raspberry, the buds furnish a potherb, and the juice hardens into caoutchouc.

**CEDAR, BASTARD BARBADOES** (*Cedrela odorata*), a tree of the natural order *Cedrelaceæ*, a native of the tropical parts of America; it is often upward of 80 feet high, with a trunk remarkable for its thickness. The wood has an agreeable fragrance, and being light and soft it is used for canoes and shingles. In France it is used in making black lead pencils. True Barbadoes cedar is *Juniper barbadensis*, and is of much less importance.

**CEDAR-BERGEN**, a mountain range in Cape Colony, stretching north and south on the east side of Olifant River Valley, in Clanwilliam division. The name is from the plantations of Cape cedar (*Widdringtonia juniperoides*), which are now, however, being fast destroyed. This is the only locality where this species is found.

**CEDAR BIRD.** See *Britannica*, Vol. XXIV, p. 461.

**CEDAR CREEK**, a river of Virginia, which gives name to a battle fought Oct. 19, 1864, between the Federals under Sheridan and the Confederates under Early.

**CEDAR FALLS**, a city of Iowa, situated on the Cedar River, 100 miles west of Dubuque. It is the seat of a State normal school, and contains a number of mills and various other manufacturing industries.

**CEDAR KEYS**, a seaport of Levy county, Fla. It is on the Gulf of Mexico, and its harbor is formed by several small islands, one of which stands a light-house. The town has an ice factory, a large trade in lumber, oysters and pencil-wood, and has a very healthful climate.

**CEDAR MOUNTAIN**, a battlefield situated in Culpepper county, Va. The action took place Aug. 9, 1862, between the Confederate and Federal forces. It resulted in a severe defeat to the Union army.

**CEDAR RAPIDS**, a city of Iowa, on the Cedar River, 79 miles southwest of Dubuque, at the junction of the Chicago and Northwestern and the Burlington, Cedar Rapids and Northern railroads. It is

also the terminus of the Dubuque and Southwestern R. R. The Coe Collegiate Institute is situated here, and the city contains in addition a high school and numerous graded public schools. The rapid current of the river at this point provides ample water-power for flour mills and various manufactories of machinery, carriages, and agricultural implements. Population in 1880, 10,104; 1890, 17,997.

**CEDAR SPRINGS**, a village of South Carolina, about ninety miles northwest of Columbia. It is the seat of the State institution for the deaf, dumb and blind.

**CEDILLA** (Sp., Fr. *cédille*, It. *zedighia*; from *zeta*, the Greek name for *z*, because it has taken the place of *z* in such words as *leczon*, modern *legon*), a mark placed under the letter *c* (thus *ç*), especially in French and Portuguese, where it is desired to give *c* the sound of *s* before the vowels *a*, *o*, *u*.

**CEDRELACEÆ**, a natural order of exogenous plants, chiefly distinguished by the winged seeds, numerous in each cell of the fruit, which is a capsule. Most of the trees are valuable for their timber. To this order belong mahogany, satin-wood, ton, etc.

**CEGLIE**, a town in Southern Italy, 21 miles northeast of Taranto. It has a trade in grain, oil and fruit. Population, 13,865.

**CELA KOVSKY**, FRANZ LADISLAUS, Bohemian poet, and professor of Slav Philosophy, born in Strakonitz, March 7, 1799, died at Prague, Aug. 5, 1852. His principal works are *Echoes of Russian and Bohemian Folk-songs* (1833-40), and a cycle of love-songs and didactic and political poems (1840). He also translated the works of Herder, Goëthe, and Scott.

**CELAYA**, a town in the Mexican State of Guanajuato, situated on the Rio Laja, about 150 miles by rail northwest of the City of Mexico. It has several fine plazas, handsome churches, and manufactories of cotton and woolen clothes and saddlery.

**CELINA**, the county-seat of Mercer county, Ohio, situated at a railroad junction on the northwest bank of the Great Reservoir. It has several churches, banks and two planing-mills.

**CELLS.** See **BACTERIA**, in these Revisions and Additions.

**CELLULOID**, or **PARKESINE**, a substance consisting chiefly of a dried solution of gun-cotton (pyroxylin). A variety of it can be made with pyroxylin and camphor. It resembles ivory, horn, tortoise-shell, and hardened India-rubber. The pyroxylin is prepared by treating cellulose from such vegetable materials as cotton, rags, paper-maker's half-stuff, or paper itself, with a mixture of one part of strong nitric acid and four parts of strong sulphuric acid. The distillate obtained by distilling wood naphtha with chloride of lime is used as a solvent for the pyroxylin. When the excess of solvent is removed from the pyroxylin, it is mixed with a considerable quantity of castor oil or cottonseed oil, and made into a paste between heated rollers. For a hard compound, the quantity of oil should be less than the pyroxylin. In a plastic condition celluloid can be spread on textile fabrics, or it may be made as hard as ivory, for which it is largely used as a substitute. Billiard balls, piano keys, and combs are made of it. It can be colored to represent amber, tortoise-shell, or malachite. In imitation of red coral it has been a great deal used for jewelry.

**CELLULOSE**, primarily, the essential constituent of the framework or wall membrane of all plant cells. It is a secretion from the contained protoplasm, but in the advancing growth of the plant the walls become incrustated with resin, coloring matter, etc. It composes the cells of wood as wax

composes the cells of a honey-comb. It is changed to glucose by long boiling with dilute sulphuric acid. A substance resembling parchment is readily obtained by treating unsized paper with cold sulphuric acid. Cellulose is also said to exist in the tunics of *Ascidia*, and in other invertebrates. It is insoluble in water, alcohol, ether, dilute alkalis, and dilute acids. It is remarkable for its insolubility, being dissolvable, so far as at present known, only by an ammoniacal solution of oxide of copper, from which it may be again precipitated. It may be bleached by the action of chlorine water. Skeleton leaves, so often made in phantom bouquets, consist of nearly pure cellulose. They are usually prepared either (a) by boiling the leaves in a dilute solution of caustic soda, and bleaching by immersion in a solution of hypochlorite of lime; or (b) by suspending the leaves in a mixture of nitric acid and chlorate of potassa for several days. It is isomeric with starch in its composition, and allied to starch, sugar, and inulin. Cotton, and bleached flax, as well as hemp, are nearly pure cellulose. With age it becomes largely transformed into lignin, suberin, or mucilage. In some filter paper, notably the Swedish, it is in almost a chemically pure state. Sugar and gum are nearly allied to it in composition. When pure it is fibrous or spongy, white, translucent and often silky. Under the microscope the fibrous varieties appear like spun glass. It is tough and extremely elastic, with a specific gravity of 1.5.

By dipping paper, or cotton, or linen fabrics in a copper ammonia solution of cellulose, and then passing the sheets between rolls, they are rendered water-proof. Several layers of such sheets of cloth or fiber pressed together form an artificial wood of enormous strength. A plastic mass of this material can be readily prepared suitable for the manufacture of water-pipes, gas-pipes, hats, clothing, boats, etc.

Cellulose, by reason of its peculiar properties, is being largely introduced into ship-building, as it is specially adapted for resisting blows, concussions, or perforations either above or below the water-line. Its component parts are carbon, hydrogen, and oxygen, and its scientific formula is given as  $C_{12}H_{20}O_{15}$ .

The material used for ship protection is usually made from the ground fiber of the cocoa nut with a small percentage of original fibers. It is extremely light, and has the property of rapidly swelling when wet. A cubic foot weighs about seven and a half to eight pounds. It is practically free from danger of fire, burning very slowly, and with great difficulty when compressed. In France experiments have been made by firing a ten-inch shot through a mattress of cellulose; but the fibers came together and swelled so rapidly that only three and a half gallons per minute of water passed through the aperture, and in a short time the aperture was closed entirely. Cellulose was first used in ship-building in 1884, but so rapidly did it obtain favor that in 1890 the French had introduced it into the construction of some forty vessels of their navy, and in the same year its use was ordered as a means of protection in the construction of ships in Russia, Holland, Japan, and Greece as well as in the American navy. Its cost is about one dollar a cubic foot, or approaching \$850 a ton.

CELT, the name by which certain weapons or implements of early inhabitants of Western Europe are known among archaeologists. Celts are either of stone or bronze.

CEMETERY. See Britannica, Vol. V, pp. 328-32.

CENOTAPH, a monument which does not contain the remains of the deceased. Cenotaphs were

originally erected for those whose bones could not be found. Latterly, the name was applied to tombs built by a man during his life-time, for himself and members of his family.

CENSER, a vase or other sacred vessel used for burning perfumes. Censers were much used in the Hebrew service of the Temple. The censer, called also a *thurible*, is used in the Roman Catholic church at mass, vespers, and other offices. It is suspended by chains which are held in the hand, and is tossed in the air, so as to throw the smoke of the incense in all directions.

CENSUS. See Britannica, Vol. V, pp. 334-40.

CENT, the one hundredth part of a dollar. The Dutch cent is a copper coin. In the United States it is a coin of copper or copper and nickel, and is nearly equal to an English half-penny.

CENTAUREA, a genus of plants of the natural order *Compositæ*, sub-order *Cynaraceæ*, containing numerous species of annual and perennial herbaceous plants, chiefly natives of temperate and cold regions. The corn-blue-bottle (*C. cyanus*), common in flower gardens, has flowers variously modified by cultivation. The generic name has its origin in an ancient legend concerning the cure of a centaur by one of these species.

CENTAURUS, the *Centaur*, a constellation in the Southern hemisphere, represented by a form half man and half horse. The stars in this constellation are 37 in number. See Britannica, Vol. II, p. 817.

CENTAURY, a genus of plants with pink or rose-colored flowers, of the natural order *Gentianaceæ*, chiefly natives of the temperate parts of Europe and Asia. The American centaur (*Sabbatia angulalis*) is extensively distributed throughout the United States and Canada.

CENTENARY, consisting of a hundred (Latin *centum*); a period of a hundred years, a term now usually employed to signify a commemoration of an event, as the birth of a great man; as, the centenary of Burns's birth, celebrated in 1859; the bi-centenary of Pope in 1888; the centenary of American Independence in 1876.

CENTERING, the framework upon which an arch, or vault of stone, brick, or iron is supported during its construction. The simplest form of centering is that used by masons and bricklayers for the arches of common windows and doors. This is merely a deal-board of the required shape, upon whose curved edge the bricks or stones of the arch are supported until they are keyed in. In building bridges or other structures where arches of great span are to be constructed, the centering is usually made of framed timbers, or timbers and iron combined.

CENTNER, in metallurgy, a weight of 100 lbs.; the pound is divided into thirty-two parts, or half-ounces, the half-ounce into two quarters, and each of these into two drams. In many European countries centner is a common name for a hundred-weight, but the centner of Germany, Austria, Sweden, Denmark, and Switzerland is now fixed at 50 kilos, or 110.25 pounds avoirdupois. The *cental* (100 pounds) of the United States and Great Britain is often called centner.

CENTOFANI, SILVESTRO, an eminent Italian writer, born near Pisa in 1794, died in 1880. He wrote several valuable works on philosophy and literary history.

CENTRAL CITY, the county-seat of Gilpin county, Colo., situated on a railroad among the Rocky Mountains. It has a fine school, and its prosperity is due to the gold mines in the vicinity.

CENTRAL FALLS, a village of Rhode Island, situated on the Blackstone River, about five miles



north of Providence. It contains a variety of important manufacturing and other industries.

**CENTRALIA**, a city and railroad junction of Marion county, Illinois. The Illinois Central R. R. Company has its machine shops here; there are also various manufactories. The fair grounds of Southern Illinois are located at Centralia.

**CENTRALIZATION**, a term which has come into general use for expressing a tendency to administer by the central government matters which would otherwise be under local management. The centralizing tendency has been a feature in most of the great states recorded in history. The Roman Empire was one of the most remarkable instances of centralization the world has ever seen.

**CENTRAL FORCES**, forces whose action is to cause a moving body to tend towards a fixed point called the center of force. By Newton's first law of motion, we know that every body continues in its state of rest or of uniform motion in a straight line except in so far as it is compelled by forces to change that state. From this we learn that, if the speed of a body changes, or if the line of motion be not straight, whether the speed be unaltered or not, some force must be acting. In the latter case the forces acting are called central forces.

**CENTER OF GYRATION**, the point at which, if the whole mass of a body rotating round an axis or point of suspension were collected, a given force applied would produce the same angular velocity as it would if applied at the same point to the body itself.

**CENTER OF MAGNITUDE**, or **FIGURE**, the point on which plane figures and curved surfaces would balance themselves, supposing their areas to have weight.

**CENTER OF PERCUSSION**. If a body receive a blow which makes it begin to rotate about a fixed axis without causing any pressure on the axis, the point in which the direction of the blow intersects the plane in which the fixed axis and the center of inertia lie is called the center of percussion. It is easily proven to be the same as the center of oscillation.

**CENTER OF POPULATION**. See **POPULATION**, in these Revisions and Additions.

**CENTER OF PRESSURE** of any surface immersed in a fluid is the point in which the resultant of the pressures of the fluid on the several points meets the surface. When the bottom of a vessel containing fluid, or when a plane immersed in fluid, is horizontal, the pressure on every point of it is the same, being that due to the weight of the column of fluid standing above the bottom or plane.

**CENTREVILLE**, a city and railroad junction, also the county-seat of Appanoose county, Iowa. It has several manufactories, and a handsome court-house; a stratum of fine coal underlies the town.

**CENTREVILLE**, a railroad town and the county-seat of Queen Anne Co., Md. It has a foundry, a fine academy, and is situated in a peach-growing section.

**CENTRIFUGAL** and **CENTRIPETAL** are terms used in botany to designate two different kinds of leaf development or inflorescence, the former term being applied when the development proceeds from the apex toward the base of the axis or leaf, and the latter when it is from the base upwards towards the apex.

**CEPHALOPTERA**, a genus of cartilaginous fishes of the Ray family, the type of the subfamily *Cephalopteridae*. Among this genus is the devil-fish of the American seas.

**CEPHEUS**, a northern constellation containing 35 stars, the brightest being of the third magnitude.

**CERAMBYX**, a genus of coleopterous insects, included among those which, on account of the length of their antennæ, are usually known as long-horned beetles. To this tribe belong the musk-beetle, remarkable for its strong and agreeable odor.

**CERAMIACEÆ**, a sub-order of *Algæ*, consisting of seaweeds of a rose or purplish color. Many of them are delicate and beautiful. A considerable number furnish an agreeable article of food, as Irish moss, and possibly the edible birds' nests of the East are made of them.

**CERAMIC**, a term used to designate the department of plastic art which comprises all objects made of clay, such as vases, cups, bassi-relievi, and the like. See **POTTERY**, *Britannica*, Vol. XIX, p. 600.

**CERASTES**, or **HORNED VIPER**, a genus of serpents of the family *Viperidæ*, natives of Africa and India, having a scale above each eyelid developed into a spine or horn of considerable length. The tail is distinct from the body. *Cerastes vulgaris* of Northern Africa is a species which was known to the ancients, and is very venomous.

**CERATE**, a compound of wax with other oily and medicinal substances, in such proportions as to have the consistence of an ointment. Simple cerate is made by melting together equal parts of white wax and olive-oil.

**CERATITES**, a genus of *Ammonitidæ*, peculiar to, and characteristic of, the Trias, distinguished from the other members of the family by having the lobes of the sutures serrated, while the intervening curves directed toward the aperture are simple.

**CERCARIA**, a name formerly given to a supposed genus of *Entozoa*, but now generally known to be the young of *trematode* worms. These creatures consist of an oval body with a thread-like tail, and swim about with great activity, but exhibit a strong instinctive propensity to penetrate into the soft bodies of insect larvæ, by means of a spine-like weapon projecting from their head. Within the body which it enters, the cercaria loses all its spines, becomes encysted, and awaits its passive migration into an animal of higher kind, there to become a trematode worm.

**CERCELEE**, or **RECELEEE**: in heraldry, a cross, circling or curling at the ends, like a ram's horn.

**CERCOCEBUS**, a genus of monkeys, natives of Asia and Africa, of the family *Cynopithecus*. They have large cheek-pouches, large callosities, and long tails. Some of the species of this genus are remarkable for their suppleness and agility.

**CERDOCYON**, a genus of *Canidæ*, apparently intermediate between dogs and foxes, natives of South America. Their aspect is thoroughly vulpine, as are also their manners. Some of them add to the dispositions of ordinary foxes a singular propensity to steal and secrete brilliant and gaudy objects. Some are natives of the coldest parts of South America, and have a rich fur.

**CEREA**, a town of North Italy, about nineteen miles southeast of Verona. Population, 5,930.

**CEREALS**, seeds, or any other grains used as food. The principal cereals are wheat, rye, oats, corn, buckwheat, rice, etc. See those topics in the several volumes of this work.

**CEREBRATION**, **UNCONSCIOUS**, a principle of action of the brain expounded by Dr. Carpenter in the fourth edition of his *Human Physiology*, published in 1853. The doctrine is the same as that of "latent thought," previously expounded in lectures by Sir W. Hamilton. The doctrine of unconscious cerebration as stated by Carpenter, Laycock, and others holds that as there can be no doubt that molecular changes in the cerebrum accompany all

our conscious mental processes, so similar changes may go on in the cerebrum without any consciousness on our part until the complete mental result is presented. It is based on the every-day experience that after one has been vainly trying to recall some name or incident, it will suddenly flash into the mind when one is thinking of some entirely different subject. According to Carpenter the cerebrum put in action by our consciousness has gone on working automatically but unconsciously, until the processes accompanying the mental operation of remembering the name or incident have been completed.

**CEREBRINE**, or **CEREBRIC ACID**, an organic acid of very complex composition, found in the liver, blood and nerves, but especially in the brain of animals.

**CEREMONIES**, **MASTER OF THE**: specifically, an officer of the royal household of England, who receives ambassadors and dignitaries. The name came to be used for the supreme authority on etiquette at public assemblies at Bath and elsewhere, and is now popularly applied to any person who regulates the forms to be observed by the company on a public occasion.

**CEREMONY**, almost any act, when performed in a regular, orderly, and formal manner, and when viewed not with reference to its object, but to the mode of its performance.

**CEREOPSIS**, a genus of birds of the family *Anatidae*, to which the New Holland goose belongs. They are natives of Australia, and are so named from the remarkable size of their cere.

**CERES**, a planetoid discovered by Piazzi at Palermo, Sicily, on the first day of the present century. It is the first discovered, and its magnitude is less than that of the moon. It presents the appearance of a star between the seventh and eighth magnitudes. See *Britannica*, Vol. II, p. 806.

**CERITHIUM**, a genus and the type of a family, *Cerithiidae*, of gasteropodous mollusca of the order *Pectinibranchiata*. The species are very numerous. Some are found in lakes and rivers, some in temperate climates, but most of them are tropical, and abound particularly in swamps.

**CEROSTROTUM**, or **CESTROTUM**, a species of encaustic painting upon horn or ivory, the lines of the design being burned in with the *cestrum*, or burning needle, and wax introduced in the furrows thus made.

**CERRO GORDO**, a plateau in Mexico, the most easterly on the route from Vera Cruz to the capital. Here April 18, 1847, the United States troops totally defeated the Mexicans.

**CERRO LARGO**, a department in the northeast of Uruguay, well watered, with large savannas and extensive forests. Area, 5,735 square miles; population, 36,000, chiefly engaged in cattle-raising. Capital, Cerro Largo, or Melo. Population, 5,000.

**CERTHIADÆ**, a family of birds, placed in the *Insessores* and tribe *Tenuirostres*. They live usually on the trunks and branches of trees, feeding on insects. The wall-creeper, and some others forming the genus *Certhia* are regarded as exhibiting the type of the family.

**CERTIFICATE**, in the law of England and of the United States, a written statement by a person having a public or official status concerning some matter within his knowledge and authority. In the United States, the word is commonly applied to any formal statement made by a public servant in the execution of his duty, as by a collector of taxes, a postmaster, etc.

**CERTIFICATION**, in the law of Scotland, the judicial assurance given to a party of the course to be followed by the judge in case he disobeys the

will of a summons, or other writ or order of the court.

**CERTIORARI**, the writ by which causes are removed from inferior courts of record into the higher or appellate court. Such removal is either before or after judgment in the inferior court. In the United States, certiorari is generally provided for by statute; but where no such provision is made, or no other mode of review of the proceedings of an inferior court has been provided by statute, any superior court exercising common-law jurisdiction has an inherent right to issue this writ.

**CERTOSA DI FAVIA**, **LA**, one of the most celebrated monasteries, situated in the neighborhood of Pavia. It was founded in 1396 by Giovanni Galeazzo Visconti, first Duke of Milan, to appease his conscience for the murder of his uncle. The church is a splendid structure in the form of a Latin cross.

**CERUMEN**, a wax-like substance secreted by certain glands lying in the external auditory canal, or the passage that leads from the external opening of the ear to the membrane of the tympanum. It acts as a lubricant. It possesses a peculiarly bitter taste, which is supposed to prevent insects from entering the auditory canal. It is popularly known as ear-wax.

**CERVERA**, a town of Spain, in the province of Barcelona, 28 miles east of the city of Lerida. It has manufactories of linen, woolen and cotton fabrics. Population, 5,300.

**CERVIN MONT**, a mountain of the Pennine Alps, about 40 miles northeast of Mont Blanc. Above an unbroken glacier line, 11,000 feet high, it rises in an inaccessible obelisk of rock, more than 3,000 feet higher. The total elevation of the mountain is 14,863 feet. The Col of Mont Cervin, used as a passage for horses and mules, has an elevation of 10,938 feet.

**CERVINARA**, a town of Italy, in the province of Principato Ultra, 12 miles northwest of Avellino. It has a trade in the produce of the district. Population, 6,328.

**CESNOLA**, **LUIGI PALMA DI**, archæologist, born near Turin, Italy, July 29, 1832. He served in the Sardinian army in 1849, in the Crimean war, and on the Union side in the American civil war, attaining the rank of colonel. He was afterwards appointed United States consul to Cyprus, where he made extensive collections of antiquities. These became the property of the Metropolitan Museum of Art (New York city) in 1873. On his return from Cyprus Col. Cesnola was appointed director of the museum. He has written a work entitled *Researches and Discoveries in Cyprus*.

**CESSIO BONORUM**, a process which the law of Scotland borrowed from that of Rome, and which also appears in most of the continental systems. On making a surrender of his estate to his creditors, the debtor was granted a judicial protection from imprisonment in respect of all debts then due by him.

**CESTIUS**, **PYRAMID OF**, a Roman monument of the Augustan age, situated close to the Porta San Paolo, partly within the walls of Aurelian. It is in the immediate vicinity of the cemetery where Protestants dying in Rome are buried. The pyramid is 125 feet high, 100 feet in width at the base, and the walls are 25 feet thick.

**CESTRUM**, the style or spatula used by the ancients in encaustic painting in wax and ivory.

**CESTUS**, a girdle worn by Greek and Roman women. The cestus of Venus was decorated with beautiful representations, and everything that could awaken love. *Cestus*, or more correctly *cestus*, is also the name given to a sort of boxing-glove worn



by the Greek and Roman pugilists. It was at first a mere leathern thong or bandage to strengthen the fist; but afterwards it was covered with knots and nails, and loaded with lead and iron, to increase the force of the blow.

**CETEOSAURUS**, or **CETOSAURUS**, a genus of large dinosaurian reptiles belonging to the Jurassic system. The species attained a length of 50 or 60 feet, and were probably not less than 10 feet in height and of a bulk in proportion. They appear to have frequented the marshes and river-sides of the period, and to have been vegetable-feeders.

**CETEWAYO**, or **CETSHWAYO**. See under **ZULULAND**, Britannica, Vol. XXIV, pp. 827-29.

**CETOTOLITES**, a name given to fossil cetacean teeth and ear-bones, which occur in great abundance in the red crag of Suffolk, a member of the Pleiocene period. Superphosphate manures have been manufactured from it on an extensive scale.

**CETRARO**, a town of Italy in the province of Cosenza, situated on the Mediterranean. It has anchovy fisheries. Population, about 3,000.

**CEYLON**. See Britannica, Vol. V, pp. 359-70. The latest official returns (1891) give the area as 25,365 square miles; population, 2,850,000. The capital, Colombo, has a population of 120,000. Until recently the chief production for export has been coffee; but now more attention is paid to tea, cinchona, coconut and other palms. There are 182 miles of railway in operation. The total public revenue for 1889 was 15,299,877 rupees, and the total expenditures 14,906,281 rs. On January 1, 1890, the public debt of the colony amounted to \$11,048,635. This debt was incurred entirely for public works, including 182 miles of railway, the Colombo break-water, and the Colombo water-works. There are under cultivation 1,944,215 acres, of which 715,847 are devoted to rice and other grains; 71,554 to coffee; 207,413 to tea; 656,766 to cocoanut palms; 39,486 to Palmyra palms; 30,083 to cinchona; 17,433 to tobacco; 37,331 to cinnamon; and 716,000 under pasture. The live-stock of the island in 1889 included 5,891 horses, 1,037,216 cattle, 116,202 goats, and 75,375 sheep. Plumbago is a valuable mining product, and in 1889 there were 753 plumbago mines. The declared value of the imports during 1889 was 60,695,135 rs.; and of the exports, 46,924,505 rs.

**CEZIMBRA**, a town of Portugal, in the province of Estremadura, on a bay of the Atlantic, about 18 miles south of Lisbon. It has active fisheries. Population, 5,000.

**CHABAS, FRANÇOIS**, French Egyptologist, born Jan. 2, 1817, at Briançon, died at Versailles, May 17, 1882. At first engaged in commerce, he found time to become a linguist; but it was not until 1851 that he devoted himself to the study of hieroglyphics. The first results of his studies appeared in 1856, followed by a series of invaluable books and papers on two important periods of ancient Egyptian history—the conquest of the country by the Hyksos, and the time of their expulsion. Among the more important of his many books are: *Les Pasteurs en Égypte* (1868); *Histoire de la XIX Dynastie et Spécialement des Temps de l'Éxode* (1873), and *Études sur l'Antiquité Historique d'Après les Sources Égyptiennes* (2d ed., 1873). From 1873 to 1877 he edited "*L'Égyptologie*."

**CHACONNE**, an old dance, probably of Spanish or Moorish origin. The movement is slow, and the music a series of variations on a ground bass of eight bars' length.

**CHAD**, St., born in Northumbria; became a pupil of St. Aidan, spent part of his youth in Ireland, and in 666 became bishop of York. Doubt having been cast on the validity of his consecration, he with-

drew in 669, but was immediately made bishop of Mercia, fixing the see at Lichfield. He died in 672, after a life eminent for humility and sanctity.

**CHADBOURNE, PAUL ANSEL**, educator, born in North Berwick, Me., Oct. 21, 1823, died in New York city, Feb. 23, 1883. He graduated at Williams College in 1848, and studied theology. He subsequently engaged in teaching, and was tutor at Williams in 1851. In 1853 he was licensed to preach, and in the same year was called to the chair of Chemistry and Botany at Williams; and when chosen to a similar chair in Boudoin, he performed the duties of both positions, and held two professorships in medical schools at the same time. He lectured at several colleges and institutes, and conducted scientific expeditions of Williams students to Newfoundland in 1855, to Florida in 1857, to Northern Europe and Iceland in 1859, and to Greenland in 1861. In 1857 he became president of the State Agricultural College of Massachusetts, and from 1867 to 1870 was president of Wisconsin University. In 1872 he was chosen president of Williams College, and the following year he again became president of the Massachusetts Agricultural College. He was a remarkable business man, took considerable part in politics, and was the author of several works, among which are: *Natural Theology; Instinct in Man and Animals; and Hope of the Righteous*. He edited "*Public Service of the State of New York*."

**CHADWICK, EDWIN, C. C. B.**, a social reformer, born at Manchester, Eng., Jan. 24, 1801, died July 5, 1890. He studied law, and was called to the bar in 1830. He early devoted his attention to questions of social, sanitary and political science, and was by Lord Grey's government appointed an assistant commissioner to inquire into the operation of the poor-laws. His report, published in 1833, commanded great attention, and laid the foundation of the later systems of government inspection. His report on interments in towns (1843) laid the foundation of later legislation on the subject. He took great interest in promoting competitive examinations for government offices, and in almost all questions of social economy, and was an active member of the Social Science Association.

**CHADWICK, JOHN WHITE**, clergyman, born in Marblehead, Mass., Oct. 19, 1840. He graduated in 1864 from the Harvard Divinity School, was chosen to the pastorate of the Second Unitarian church, of Brooklyn, N. Y., and became widely known for the radical doctrines preached by him, and his articles contributed to Unitarian periodicals. In the list of his published works are: *Life of N. A. Staples; A Book of Poems; The Bible of To-day; The Man Jesus; and A Daring Faith*.

**CHÆTODON**, a typical genus of a family of bony fishes, known as squamipennes. They are tropical fishes, abounding near coral reefs and are beautifully colored. About seventy species are found in the tropical Atlantic and Indo-Pacific waters. It has one dorsal fin and a moderately long snout, which in some species is used to draw animals from their crevices. It often gets false credit for catching insects by spouting water. The archer-fish is an allied genus.

**CHAFER**, a common name for beetles or coleopterous insects, which, either in the perfect or larval state, are destructive to plants, particularly those which devour the wood, bark or roots of trees. The word chafer is seldom used alone, but generally with some prefix, as rose-chafer, bark-chafer, etc.

**CHAFFEE, JEROME BUNTY**, Senator, born in Niagara county, N. Y., April 17, 1825, died in Salem Centre Westchester county, N. Y., March 9, 1886. He lived in New York State for about twenty years, removed

to Michigan, to St. Joseph, Mo., and in 1859 became one of the first settlers in Denver, Colo. Mining ventures brought him wealth, and he was prominent in organizing the territory. He represented it in Congress in 1876, and when it attained statehood he sat for it in the United States Senate. He was an Independent Republican, and chairman of the Republican national committee in 1884.

CHAGNY, an important railway junction and commercial center in the French department of Saône-et-Loire, on the Canal-du-Centre, 32 miles south of Dijon. As the key of the roads to the Loire district, it has been strongly fortified. Population, 4,291.

CHAGRIN FALLS, a village of Cuyahoga county, Ohio, on the Chagrin River. It has iron foundries, and various mills, where water-power is applied. It has good flagstone quarries.

CHAIN, in surveying, a measure 22 yards long, composed of 100 iron links.

CHAIN-MAIL, or CHAIN-ARMOR, an armor much used in the 12th and 13th centuries. It consisted of hammered iron links connected into the form of a garment. Such armor was much more flexible and convenient to the wearer than one formed of steel or brass plates, but was less fitted to bear the thrust of the lance.

CHAIN-SHOT, destructive missiles formerly used in naval warfare. They consisted of two balls connected by a piece of chain eight or ten inches in length, and were fired collectively from the gun. The chain enabled the balls to catch and destroy objects which otherwise might have escaped.

CHAINS, on shipboard, strong iron links or plates bolted at the lower end to the ship-timbers, and having a block or *dead-eye* at the upper end. Their purpose is to fasten down the shrouds tightly.

CHAIRS. See FURNITURE, Britannica, Vol. IX, pp. 849-50.

CHALAZA, in botany, a membrane which unites the nucleus and integuments at the base of an ovule. It is traversed by vessels which supply nourishment to the ovule. The cords which bind the yolk-bag of an egg to the lining membrane at the two ends of the shell, and keep it near the middle as it floats in the albumen, are also called *chalazæ*.

CHALCEDONY, a variety of quartz which constitutes the principal part of many agates, and is generally translucent. It is much used in jewelry and ornaments of all sorts. It occurs in old lavas and trap-rocks, and is found in all parts of the world where these exist. See Britannica, Vol. I, p. 277; Vol. XVI, p. 389; Vol. XVII, p. 776.

CHALCEDONYX, a name given to agates formed of cacholong, or a white opaque chalcedony, alternating with a grayish translucent chalcedony.

CHALCHIHUITL, the Indian name of a bluish-green stone, taken from a quarry near Santa Fé, and by some regarded as a species of turquoise, by others identified with jade. It was valued above gold by the ancient Mexicans, who fashioned it into beads and ornaments.

CHALCIDIDÆ, a small family of short-tongued lizards, natives of tropical America. See Britannica, Vol. XIV, p. 733.

CHALCOGRAPHY, a pedantic term used to signify engraving on copper.

CHALDER, an old Scotch dry measure containing nearly 12 quarters Winchester measure, or 16 bolls.

CHALDRON, a measure formerly used in England for selling coal. It contained 36 heaped bushels.

CHALET, the French-Swiss name for the wooden hut of the Swiss herdsmen on the mountains. The

term is also extended to Swiss dwelling-houses generally, and to picturesque and ornate villas built in imitation of them.

CHALEUR BAY, an inlet of the Gulf of St. Lawrence, Canada, having Quebec on the north and New Brunswick on the south. It measures 90 miles from east to west, is everywhere deep and well sheltered, and is much frequented for its mackerel fisheries.

CHALICE, an ancient name for an ordinary drinking-cup, but now only applied to the cup in which the wine of the holy sacrament is administered. Chalices are commonly made of silver, but it is not unusual for them to be of gold, or gilt and jeweled.

CHALKING THE DOOR, a mode of warning tenants to remove from burghal tenements, long known and still in use in Scotland. A burgh-officer, in presence of witnesses, chalks the most patent door forty days before Whitsunday, having made out an execution of "chalking," which must be subscribed by himself and two witnesses. The execution of chalking is a warrant under which decree of removal will be pronounced by the burgh court, in virtue of which the tenant may be ejected on the expiration of a charge of six days.

CHALKY ISLAND, in New Zealand, near the south extremity of Middle Island. It takes its name from being composed of a mass of white limestone.

CHALYBEUS, a genus of birds remarkable for the brilliancy of their plumage. They are natives of New Guinea.

CHALYBEATE WATERS, waters which contain a considerable proportion of iron in solution.

CHAM, the pseudonym assumed by the caricaturist Amédée de Noé (1819-79), born at Paris in 1819. He studied art under Delaroche, and soon acquired a great reputation as a skillful and witty delineator of the humorous side of Parisian life. In 1834 he began his famous connection with the "Charivari," in which paper and in the "Journal des Pêlerinages" he continued to delight his fellow-citizens until close upon his death in 1879.

CHAMA, a genus of bivalve mollusks, found only in the seas of warm climates. The shell is generally thick, and is foliated with leaf-like projections.

CHAMÆROPS, a genus of palms with fan-shaped leaves, less exclusively tropical than palms in general. Its leaves are employed for various useful purposes, as for thatching, hats, cordage, chair-bottoms, brooms, pasteboard, paper, etc. See Britannica, Vol. XVIII, pp. 189-90.

CHAMALARI, a peak of the Himalayas, 23,944 feet high, between Thibet and Bhutan, 140 miles east of Mount Everest.

CHAMBERLAIN, a thriving city of South Dakota, county-seat of Brulé county, situated on the left bank of the Missouri River, in the midst of a fertile and well-settled district. It is an important center of trade and transportation.

CHAMBERLAIN, DANIEL HENRY, a governor of South Carolina, born in West Brookfield, Mass., June 23, 1835; graduated at Yale in 1862, and the Harvard law-school in 1863. The following year as lieutenant of a Massachusetts colored regiment he entered the army, serving in several of the Southern States. He engaged in cotton-planting in South Carolina after the war; was appointed delegate to the constitutional convention of 1868, and elected attorney-general of the State. In 1874 the Republicans elected him to the office of governor, and in 1876 he was reelected, but the result was opposed and questioned by the friends of the defeated candidate, Wade Hampton, and after holding office for



three months Gov. Chamberlain resigned and went to New York city, where he resumed his legal work.

CHAMBERLAIN, THE RIGHT HON. JOSEPH, M. P., born in London in July, 1836, and educated at University College. He joined the firm of Nettlefold, screw-makers of Birmingham, and for many years devoted himself almost entirely to business. Elected mayor of Birmingham in 1873, reelected in 1874 and again in 1875, his term of office was remarkable for the expeditious dispatch of corporate business. About this period his name was brought prominently before the public by several articles written by him for the "Fortnightly Review," in which he expressed very advanced political and educational views. In 1876 Mr. Chamberlain was elected M. P. for Birmingham without opposition, and from that date his career is to be traced in Parliament and on the public platform. On the return of the Liberals to power in 1880 he was appointed president of the Board of Trade, with a seat in the cabinet. His influence as a political leader increased rapidly outside the House, and on his exit from office in 1885 he was elected for the western division of Birmingham, and held the office of president of the Local Government Board until his divergence of views on the Irish policy of Mr. Gladstone caused his resignation (March, 1886). He was subsequently appointed British commissioner to the Conference at Washington for the settlement of the fishery disputes between Canada and the United States. He revisited the United States on the occasion of his marriage with Miss Endicott (Nov. 15, 1888). His speech in the House of Commons in February, 1890, on free education was the subject of much comment.

CHAMBERLAIN, JOSHUA LAWRENCE, soldier and educator, born in Brewer, Me., Sept. 8, 1828. He graduated at Bowdoin in 1852, and at Bangor theological seminary three years later. From 1856 to 1865 he held professorships in Bowdoin College with the exception of the time of the civil war, during which he served gallantly, being several times wounded, and was brevetted major-general. He was elected governor of Maine in 1866, and served till 1871, being then chosen president of Bowdoin College; this office he held till 1883. In 1876 he was elected major-general of the State militia.

CHAMBERS, CHARLES JULIUS, author, born at Bellefontaine, Ohio, Nov. 21, 1850, graduated at Cornell in 1870; became special correspondent in the West Indies, Europe, Canada and the United States for the "New York Herald," equipped a canoe expedition to Lake Itasca in 1872, and in 1875 simulated insanity, and was incarcerated for several weeks in an insane asylum for the purpose of ascertaining how such people are treated. He is a contributor to current literature, and has published *A Mad World*; *On a Margin*; and *Lovers Four and Maidens Five*.

CHAMBERS, TALBOT WILSON, Reformed Dutch clergyman, born in Carlisle, Feb. 25, 1819, graduated at Rutgers in 1834 and studied theology, being licensed to preach in 1838, and ordained to the pastorate of the 2d Reformed Dutch church in Somerville, N. J. In 1850 he became pastor of the Collegiate Dutch church of New York city. He was on the American committee which revised the Old Testament.

CHAMBERS, WILLIAM, LL.D. (1800-83), publisher, born April 16, 1800, at Peebles. He received a fair elementary education, but owing to his father's misfortune his schooling terminated with his 13th year. The family migrated to Edinburgh in 1813, and next year William was apprenticed to a book-seller. When his five years were up he

started business in a humble way for himself. Between 1825 and 1830 he wrote the *Book of Scotland*, and in conjunction with his brother Robert a *Gazetteer of Scotland*. His experience gained as a book-seller and printer resulted in the founding of "Chambers's Edinburgh Journal" in 1832. This was about six weeks in advance of the "Penny Magazine," and may be considered the pioneer of that class of cheap and popular periodicals, of a wholesome kind now so generally diffused. At the end of the 14th number he united with his brother Robert in founding the business of William and Robert Chambers, in which they were associated in writing, editing, printing and publishing. W. & R. Chambers issued a series of works designed for popular instruction, including, besides the "Journal," *Information for the People*, two volumes; the "Educational Course" series; *Cyclopædia of English Literature*, two vols.; *Miscellany of Useful and Entertaining Tracts*, 20 vols.; *Papers for the People*, 12 vols.; and the *Encyclopædia*, 10 vols. (1859-68; new edition, 1888-92.)

In 1859 William founded and endowed an institution in his native town for purposes of social improvement. Twice elected Lord Provost of Edinburgh he occupied that office for four years, during which he promoted several important public acts, including one for the improvement of the older part of the city, which has resulted in a great diminution of the death-rate. He also carried out at his own cost a thorough restoration of St. Giles's Cathedral. He died May 20, 1883, having shortly before received the offer of a baronetcy. He was made LL.D. of Edinburgh in 1872. A statue has been erected to his memory in Edinburgh. Besides many contributions to the "Journal," he was author and editor of various volumes, and wrote the *Youths' Companion and Counsellor*, *Allie Gilroy, Stories of Remarkable Persons*, and *Historical Sketch of St. Giles's Cathedral*.

CHAMBERS, private rooms attached to most of the courts in which the judges and chief clerks transact a large amount of judicial business. Counsel attend in chambers only in important matters.

CHAMBERSBURG, a town of New Jersey, a suburb of Trenton. It is the seat of an academy, a hospital, and a convent.

CHAMBERSBURG, a town of Pennsylvania, county-seat of Franklin county, situated on the east bank of the Conococheague Creek, about 50 miles west of Harrisburg. It is the seat of Wilson College, and of a great variety of manufacturing industries.

CHAMBERTIN, a famous red Burgundy wine obtained from a vineyard in the French department of Côte-d'Or, seven miles south of Dijon. It ranks among the chief red wines of the world.

CHAMBORD, HENRI COMTE DE, born in Paris in 1820, died 1883. See *Britannica*, Vol. IX, p. 620.

CHAMBRE ARDENTE (fiery chamber), a name given at different times in France to an extraordinary court of justice, probably on account of the severity of the punishments which it awarded, the most common being that of death by fire. In 1535 Francis I established an inquisitorial tribunal and a chambre ardente. Both were intended for the extirpation of heresy. The former searched out cases of heresy and instructed the processes, while the latter both pronounced and executed the final judgment.

CHAMELEON, a southern constellation within the antarctic polar circle, containing nine stars.

CHAMFERING, in architecture, an angle which is slightly pared off is said to be chamfered. Chamfers in Gothic architecture have frequently ornamental terminations of various kinds.

**CHAMOND**, St., a town of France, in the department of Loire. It is well built, has extensive manufactories of ribbons and stay-laces; also several silk mills, numerous iron furnaces and foundries. Population, 13,482.

**CHAMORERIL**, a lake of Ladakh, or Middle Tibet. It lies at a height of 15,000 feet above the sea, on the plateau between the upper waters of the Sutlej and of the Indus, girt by mountains which rise 5,000 feet above its own level.

**CHAMPAC**, or **CHAMPAK**, an Indian tree, *Michelia champaca*, natural order *Magnoliaceae*, possessing great beauty both of foliage and flowers, and held in high esteem by Brahmans and Buddhists. It is planted about their temples, and images of Buddha are made of its wood. Its beautiful yellow flowers and their sweet perfume are much celebrated in the poetry of the Hindoos. The timber of this and other species is useful and fragrant, and the bark and root are employed in native medicine.

**CHAMPAIGN**, a city and railroad center of Champaign county, Ill., 128 miles south-west of Chicago, in the midst of a rich agricultural region. It has a pretty park of 10 acres, and a young ladies' seminary. Pop. in 1890: city, 5,839; township, 6,619.

**CHAMPARTY**, or **CHAMPERTY** (a Norman-French word, derived from *champipars*): in law, a bargain whereby the one party is to assist the other in recovering property, and is to share in the proceeds. All such bargains are illegal, and therefore null and void. More particularly, an agreement to advance funds or supply evidence or professional assistance, for remuneration contingent on success, and proportional to, or to be paid out of, property recovered, is illegal; so is a purchase by an attorney from his client of the subject-matter of a pending suit; so is every such purchase if the real object is only to enable the purchaser to maintain the suit. A man may, however, lawfully sell evidence, and may lawfully purchase an interest in property, though adverse claims exist which make litigation necessary for realizing that interest.

**CHAMPFLEURY**, the assumed name of Jules Fleury-Husson, French author, born at Laon, Sept. 10, 1821. In a number of early pieces for the theater, as well as later romances, he has achieved some distinction as a realistic writer. Works of greater value, however, are those on the history of caricature, of literature, and of art, from 1825 to 1840, and his *Bibliographie Ceramique* (1882).

**CHAMPION**. In the judicial combats of the Middle Ages women, children, priests and aged persons were allowed to appear in the lists by a representative, and such hired combatant was called a champion (see *Britannica*, Vol. XVII, p. 820). In the age of chivalry, it signified a knight who entered the lists on behalf of any one incapable of self-defense. In England the crown had its champion, who, mounted on horse back and armed to the teeth, challenged, at every coronation at Westminster, all who should deny the king to be the lawful sovereign.

**CHAMPION HILLS**, Hinds county, Miss., the scene of a severe conflict between General Grant's army and the Confederates under General Pemberton. It was fought May 16, 1863, and is sometimes called the battle of Baker's Creek.

**CHAMPLAIN**, in American geology, a term originally applied to a portion of the Paleozoic series of the State of New York, and subsequently given by Professor Dana to the period succeeding the glacial. The Champlain period is to some extent equivalent to the Post-glacial period of English geologists.

**CHAMPLAIN LAKE**, a narrow body of water 125 miles long, which forms part of the boundary be-

tween the States of New York and Vermont. It extends from Whitehall, N. Y., to Canada. Two important battles were waged upon this lake between the British and American forces. The dates of the battles are Oct. 13, 1776, and Sept. 11, 1814.

**CHAMPLIN**, JAMES TIFT, educator, born in Colchester, Conn., June 9, 1811, died in Portland, Me., March 15, 1882. He graduated with the first honor in the class of 1834 at Brown University, taught there for three years, was pastor of a Baptist church in Portland, Me., from 1838 to 1841; was called to a professorship of Waterville (now Colby University), and became president there in 1857, serving till 1873. He edited *Demosthenes on the Crown*; *Demosthenes's Select Orations*; *Eschines on the Crown*; and published educational works, such as the *Text-book of Intellectual Philosophy*; *First Principles of Ethics*, and *Constitution of the United States with Brief Comments*.

**CHAMPLIN**, JOHN DENISON, author, born in Stonington, Conn., Jan. 29, 1834, graduated at Yale in 1856, studied law, and went into practice in New York city. He was connected with the Bridgeport "Standard" and "The Sentinel," after which he wrote for periodicals, and in 1873 edited *Fox's Mission to Russia*. Two years later he was associate editor in the revision of the *American Cyclopædia*. Mr. Champlin wrote many instructive reference books for young people, and a description of a coaching trip in England with Andrew Carnegie in *Chronicle of the Coach*, and is editor of Scribner's art cyclopædias.

**CHAMPLIN**, STEPHEN, naval officer, born in South Kingston, R. I., Nov. 17, 1789, died in Buffalo, N. Y., Feb. 20, 1870. When 16 years of age he went to sea, and at 23 years of age engaged in the naval operations of the war of 1812. He commanded successively the ships *Scorpion*, the prize ships *Queen Charlotte* and *Detroit*, the *Tigress*, the schooner *Porcupine*, the receiving ship *Fulton*, and the *Michigan*. In 1855 he was placed on the retired list, and in 1862 promoted to the rank of commodore. He was the last survivor of the battle of Lake Erie.

**CHAMPNEY**, JAMES WELLS, artist, born in Boston, Mass., July 16, 1843, served for a short time as volunteer in the 45th Mass. regiment. He taught drawing, and has spent several seasons in Europe studying art, his first teacher being Edouard Frère, of Paris. He is a member of the American Watercolor Society, and an associate member of the National Academy. His paintings include: *Which is Umpire? Indian Summer*; *Boarding-School Green-Room*; *He Loves Me*; *Griselda*; and *Song Without Words*. His wife, Lizzie Williams (born in Ohio in 1850), is a clever writer, and the author of charming books. Besides the "Vassar Girl" series, she has written *In the Sky-Garden*; *All Around a Palette*, and *Sebä's Tangled Web*. Her husband has illustrated many of her books.

**CHANAK-KALESSI**, a town of Anatolia, situated on the Dardanelles, about 25 miles southwest of Gallipoli. It derives its name from its manufactures of crockery.

**CHANCE**, in its original and strict meaning, that which determines the cause of events in the absence of the law, ordinary causation, or providence. Strictly speaking, it is an idea which few would now be disposed to admit as corresponding to anything which really exists; the religious mind excluding it as inconsistent with the belief in the Divine government, and the philosophical mind rejecting it as inconsistent with a recognition of universal laws of causation. As a word, however, it has always been, and always will be, popularly accepted, and its use is correct so far as we overlook,



or choose for the moment to throw out of view, the more universal connection of events, and regard them as their emergence, on a superficial view, appears to be determined. It is clear that chance, being only legitimate as an expression in popular parlance, is a term which is too indefinite to admit of any kind of measurement.

CHANCEL, the space in the church that is inclosed and railed off from the choir. The chancel was, and still is in some churches, separated from the nave by a screen of lattice-work, so as to prevent general access thereto.

CHANCELLORSVILLE, a village of Virginia, near the south bank of the Rappahannock, about 10 miles west of Fredericksburg. It was the scene of a severe battle fought May 2 and 3, 1863, in which the Union forces under General Hooker were defeated by the Confederates under General Robert E. Lee.

CHANCERY. See *Britannica*, Vol. V, pp. 389-90.

CHANDAUSI, a town of the North-West Provinces of India, 27 miles south of Moradabad. Population, 27,521.

CHANDERI, a town of Central India, 105 miles south of Gwalior. It is now an insignificant place; but its fort and many ruined buildings attest its strength and splendor in former times, when it is said to have contained 14,000 stone houses, 384 markets, 360 caravansaries and 12,000 mosques.

CHANDLER, CHARLES FREDERICK, chemist, born in Lancaster, Mass., Dec. 6, 1836. He pursued scientific studies at Harvard and at foreign universities, and on his return to America was for seven years professor of chemistry in Union College. He was then employed in the organization of the Columbia School of Mines in New York city. Since that time he has been connected with the college, holding the chair of chemistry in that institution and in the New York College of Pharmacy. He has also been chemist to the Metropolitan board of health, and in 1873 was appointed president. In the College of Physicians and Surgeons he was, in 1876, appointed professor of chemistry and medical jurisprudence. As officer of the board of health Mr. Chandler has given attention to the subject of food adulteration, has compelled the location of slaughter-houses to be along a narrow area on the river side, and has obtained the passage of the Tenement-house act, which provides that the plans for such buildings be submitted to the health board. Aside from the reformatory work which he has accomplished for New York city he has analyzed the waters of several springs, has lectured frequently, and has investigated the water supply of Albany, New York and other cities. He is a member of several scientific societies, both at home and in Europe. Reports of his investigations have been published, many of them appearing in the "American Chemist," a periodical established in 1870 by himself and his brother, William Henry Chandler. The latter is a well-known chemist, and has been professor of this science at Columbia School of Mines (1868-71), and at Lehigh University. He was a juror at the United States centennial exhibition of 1876, and at the Paris exhibition two years later.

CHANDLER, JOSEPH RIPLEY, philanthropist and diplomat, born in Kingston, Mass., Aug. 25, 1792, died in Philadelphia, Pa., July 10, 1880. For several years he taught a successful school in Philadelphia, and was connected with the "United States Gazette," which afterward became the "North American." From 1849 to 1851 he was a member of Congress, representing the Whig party. In 1858 he was sent by President Buchanan as minister to the Two Sicilies. He published an English gram-

mar and many addresses. He was interested in the subject of prison reform.

CHANDLER, ZACHARIAH, Senator, born in Bedford, N. H., Dec. 10, 1813, died in Chicago, Ill., Nov. 1, 1879. He received a common school education and went to Detroit, in 1833, where he established himself in the dry-goods business. His energy brought success, while the same spirit in political matters soon made him prominent as a Whig and an active supporter of the "under-ground railroad," of which Detroit was a terminus. In 1851 he was elected mayor of the city, and the following year was an unsuccessful candidate for the office of governor. In 1857 he succeeded Gen. Lewis Cass in the U. S. Senate, and remained in this official body till his death, with the intermission of the years between 1875 and 1879. Senator Chandler took an active part in debates of Congress, opposing the admission of Kansas under the Lecompton constitution, advocating the war in defense of the Union, and insisting that the short term of enlistment for the volunteers first called for was a mistake; he also favored a sweeping confiscation bill, the stern measures of which would deter wavering persons from taking arms against the Government. In 1874 President Grant offered him the position of Secretary of the Interior, which office he held till the election of Grant's successor. He was chairman of the Republican national committee in 1868 and in 1876.

CHANDORE, a town and fort in the district of Ahmednuggar, presidency of Bombay. The town is a flourishing place, with a population of 7,000.

CHANDOS, the name of an English family descended from a follower of William the Conqueror, the last representative in the direct male line being Sir John Chandos (died 1428), whose sister married Giles Brydges. Their descendant, Sir John Brydges, was lieutenant of the Tower under Queen Mary, and was created Baron Chandos in 1554. James Brydges (1673-1744), eighth Lord Chandos, sat in Parliament for Hereford from 1698 to 1714, and was created Duke of Chandos in 1719. In 1796 the title passed by marriage to the family of Grenville, the present dukes of Buckingham and Chandos.

CHANG and ENG, Siamese twins, born in Bangaseau, Siam, April 15, 1811, died near Mount Airy, N. C., Jan. 17, 1874. Their bodies were joined by a fleshy band near the waist, and on this account they were exhibited by P. T. Barnum for many years as monstrosities. They earned nearly \$80,000 by exhibitions, and retired to North Carolina, where they became farmers. They married sisters, by whom they had children—Chang six, Eng five.

CHANGARNIER, NICHOLAS ANNE THÉODORE (1793-1877), a French general, born in 1793. He received his education at the military school of Saint-Cyr. In 1830 he went as lieutenant to Algeria, and after the proclamation of the Republic in 1848 he was appointed governor-general. Returning to Paris, he was appointed commander-in-chief of the garrison of Paris and of the National Guard. As a member of the Legislative Assembly he opposed the Bonapartists, and in 1851 he was arrested and sent to the fortress of Ham. He lived in exile till the Franco-Prussian war, when he offered his services to Louis Napoleon, and was made a general. In 1871 he returned to France, and died in 1877.

CHANG-CHOW, a city of China, in the province of Kiang-su, about 50 miles southeast of Nanking. Population, 360,000.

CHANGELING. It was at one time a popular superstition that beautiful and charming infants were taken from their cradles by fairies, who left instead stupid, ugly ones. The children so left were called *changelings*. As it was supposed that fairies

had no power to change children that had been christened, infants were carefully watched till that ceremony had been performed.

CHANG-SHA-FOO, a city of China, capital of the province of Hoo-nan on the Heng-Kiang, 50 miles south of its embouchure in Lake Tong-Ting-Hoo.

CHANK-SHELL (TSJANKA), the popular name of the shell of several species of *Turbinella*, a genus of gastropod mollusks, natives of the East Indian Seas. These shells are obtained chiefly on the coasts of the south of India and Ceylon, and form a considerable article of trade to Calcutta.

CHANNEL, ENGLISH, that arm of the Atlantic Ocean which divides England from France, gradually narrowing to the Strait of Dover. The greatest river which falls into it is the Seine. It forms bays both on the English and the French coast, those on the French coast being the largest.

CHANNING, WALTER, physician, brother of Rev. William Ellery Channing, born in Newport, R. I., April 15, 1786, died in Boston, Mass., July 27, 1876. He studied at Harvard, but on account of a "rebellion" in 1807 did not graduate. He pursued the study of medicine in Boston, Philadelphia, Edinburgh, and London. In 1812 he began to practice in Boston, and from 1815 to 1854 occupied the chair of obstetrics and medical jurisprudence at Harvard. For nearly 20 years he was physician in the Massachusetts General Hospital. He has published poems, books of travel, and medical works.

CHANNING, WILLIAM ELLERY, JR., author, a son of Dr. Walter Channing, and nephew of William E. Channing, Sr., born in Boston, Mass., June 10, 1818, and studied at Harvard, but did not graduate; lived in a log hut in Illinois, removed to Cincinnati, where he was connected with the "Gazette," then came to Massachusetts, married Margaret Fuller's sister, and settled in Concord. He has published volumes of poetry and of prose, and has been on the staff of the New York "Tribune," and also of the New Bedford "Mercury."

CHANNING, WILLIAM HENRY, Unitarian clergyman and orator, son of Francis Dana Channing, and nephew of William Ellery Channing, born in Boston, May 25, 1810, died in London, Dec. 23, 1884. He graduated at Harvard in 1829, and at the Divinity School four years later. He held pastorates in Cincinnati, Boston, Rochester, and New York. As a platform speaker it is said he has never been surpassed. He was interested in Fourierism and other schemes for social reorganization. He wrote a memoir of his uncle, and was chief editor of the memoirs of Margaret Fuller Ossoli. The last years of his life were spent in England, and his eldest daughter is the wife of the poet Edwin Arnold.

CHANTILLY, a small village of Fairfax county, Va., 20 miles west of Washington, where during a severe thunder-storm a fierce battle took place between General Pope's forces and the Confederates commanded by "Stonewall" Jackson. It was fought Sept. 1, 1862, and Generals Phil. Kearney and I. I. Stevens were both killed.

CHANTRY, a term applied alike to endowments or benefices, to provide for the chanting of masses and to the chapels in which the chanting takes place. A chapel attached to a church, in which services for prayer, church meetings, etc., are held, is also called a chantry.

CHANZY, ANTOINE EUGENE ALFRED (1823-83), French general, born at Nouart (Ardennes), March 18, 1823, entered the artillery as a private, received a commission in the Zouaves in 1841, and served almost uninterruptedly in Africa till 1870. He was elected to the National Assembly, and narrowly escaped being shot by the Communists in 1871. In

1873-79 he was governor-general of Algeria. Chosen a life Senator in 1875, he was put forward for the presidency in 1879. He was ambassador at St. Petersburg from 1879 to 1881, and afterwards commanded the 6th army corps at Chalons, where he died Jan. 4, 1883.

CHAOS, in the ancient cosmogonies, that vacant infinite space out of which sprang all things that exist. Ovid represented it as that confused, shapeless mass out of which the universe was formed into a *kosmos*, or harmonious order.

CHAOS, or BIRD ISLANDS, the name given to several rocky islets situated at the entrance of Algoa Bay, South Africa.

CHAOU-CHOW-FOO, a city of China, and capital of a department of the same name in the province of Kwang-tung.

CHAOU-KING-FOO, a city and capital of a department of the same name, in the province of Kwang-tung.

CHAPALA, the largest lake in Mexico, with an area of about 1,300 square miles. It is an expansion of the Rio Grande de Santiago. Chapala lies on the table land of Jalisco, and contains numerous islands.

CHAP-BOOKS, tracts of a homely kind, which at one time formed the only popular literature of Great Britain and the American colonies. They were of a miscellaneous kind, including theological tracts, lives of heroes, martyrs, wonderful personages, fortune-telling, interpretations of dreams, stories of ghosts, witches, histories in verse, songs, ballads, etc. They were sold by chapmen, or peddlers—hence the designation.

CHAPEL, a word derived from *capa*, which originally signified a case, or chest, in which were contained the relics of a saint, and afterwards the place where the chest was kept. The term now signifies a building erected for the purpose of public worship, but not possessing the full privilege and characteristics of a church.

CHAPELLE, LA, the name of several places in France, the most important of which forms a northern suburb of Paris. Chemicals, salt, starch, liqueurs, etc., are manufactured. Population, 33,436.

CHAPERON, a hood or cape worn by Knights of the Garter when in full dress. A person who acts as a guide and protector to a lady at public places is called a chaperon, probably from this particular piece of dress having been used on such occasions. The name was also applied to devices which were placed on the heads of horses at pompous funerals.

CHAPIN, EDWIN HUBBELL, Universalist clergyman, born in Union Village, Washington county, N. Y., Dec. 29, 1814, died in New York city, Dec. 27, 1880. He graduated at Bennington Seminary, Vt., studied law in Troy, N. Y., edited "The Magazine and Advocate" in Utica, and studied for the ministry, being ordained in 1837. He preached afterwards at Richmond, Va., for three years; at Charlestown, Mass., for six years; at Boston, where he was the colleague of Hosea Ballou, and in 1848 became pastor of the Fourth Universalist church of New York city. Dr. Chapin was considered a powerful orator, and his services on public occasions were in great demand. In 1850 he was a delegate to the peace congress at Frankfurt-on-the-Main. In 1872 he became editor of the "Christian Leader." Among his publications are: *Hours of Communion*; *Moral Aspects of City Life*; *True Manliness*; *Humanity in the City*; and *A Crown of Thorns: a Token for the Suffering*. The last mentioned was the most popular of his works.

CHAPLAIN, originally an ecclesiastic who accompanied an army and carried the relics of the



patron saint. It now signifies a clergyman employed to officiate at court, in the household of a nobleman or bishop, in prisons, with troops, for a legislative body, and on board ship. An army chaplain is a clergyman especially commissioned to do duty with troops. Chaplains are sent with the troops, and in peace are allotted to the various military stations. Their duties are to conduct divine service in camp or barracks, officiate at burials, baptisms, and churchings, visit the hospital and barrack-rooms, give religious instruction in the schools, and generally treat the soldiers and their families as their parishioners. In the United States army regimental chaplains and post-chaplains may be of any of the regular denominations. They mostly have the rank of captain. In the navy every large ship in commission has a chaplain, who performs divine service at stated times on ship-board, visits the sick sailors, and assists in maintaining moral discipline among the crew.

CHAPLEAU, JOSEPH ADOLPHE, Canadian statesman, born in Ste. Therese-de-Blainville, Terrebonne, Quebec, Nov. 9, 1840. He was admitted to the bar of Lower Canada in 1861, and soon made a brilliant reputation in the criminal courts. In 1867 he represented his county in the first legislature of the province of Quebec. He became Queen's counsel in 1873, held the office of solicitor-general in Mr. Oulmet's cabinet, and two years later (1875) was champion speaker of the Conservatives, winning such success that he was called into the De Boucherville Ministry as provincial secretary and registrar. In 1878 Mr. Chapleau was elected leader of the party, and the following year became premier of Quebec and minister of agriculture and public works. He was invited to enter the Dominion cabinet, but for political reasons did not do so until the invitation was renewed in 1882, when he became member of the Privy Council and Secretary of State of Canada. The following month, August, he was elected to the House of Commons by his county. Mr. Chapleau is the finest orator among the French-Canadians, is leader of the party which opposes the ultramontanes, or *Castors*, has been professor of criminal jurisprudence, and is professor of international law in the Montreal section of Laval University.

CHAPLET, a garland or head-band of leaves and flowers. In heraldry a chaplet is always composed of four roses, the other parts being leaves.

CHAPMAN, a trader, but popularly applied in a more limited sense to a dealer in small articles, who travels as a peddler or attends markets. Our familiar *chap*, "a fellow," is an abbreviation of the name, which is derived from Anglo-Saxon *ceap*, "trade."

CHAPONE, HESTER, MRS., English authoress, was born at Twywell, Northamptonshire, Oct. 27, 1727, died at Hadley, Dec. 25, 1801. She wrote a short romance in her tenth year, and after her mother's death her attention was divided between household duties and the study of French, Italian, Latin, music and drawing. She wrote for the "Rambler," "Adventurer," and "Gentleman's Magazine," and soon became known to a large literary circle; but she is now chiefly remembered by her *Letters on the Improvement of the Mind* (1772), which went through many editions.

CHAPPAQUA, a small village of Westchester county, N. Y., on the Harlem railroad, where Horace Greeley had his summer home. Here is a good boarding school under the control of the Society of Friends.

CHAPPED HANDS, a form of inflammation of the skin of the back of the hands, characterized by abnormal dryness and roughness. It is caused by ex-

posure to cold and moisture or strong soap, and can generally be prevented or cured by carefully drying the hands after washing, and applying lemon juice or vinegar, with perhaps glycerine, or vaseline.

CHAPPELL, WILLIAM, F. S. A., English author and publisher, was born Nov. 20, 1809, died in London, Aug. 20, 1888. He spent the greater part of his life in London, where he was for some years a member of a great music publishing house. His first work of importance was *A Collection of National English Airs* (2 vols., 1838-40). This work ultimately grew into the greater and entirely rewritten work, *Popular Music of the Olden Time* (2 vols., 1855-59). The first volume forms a complete collection of English airs, so far as known, down to the reign of Charles I.; the second is rather a selection, containing, however, all the more interesting or important airs of later date. Mr. Chappell took a principal part in the foundation in 1840 of the Musical Antiquarian Society, and the Percy Society, and edited some of Dowland's songs for the former and several rare collections for the latter. He published papers in the *Archæologia*, contributed valuable notes to Hales and Furnivall's reprint of the *Percy Folio MS.* (1867-68), and annotated the first three volumes of the Ballad Society edition of *The Roxburghe Ballads*. Mr. Chappell published in 1874 the first volume of a *History of Music*.

CHAPRA, a town of Bengal, situated on the Gogra, near its confluence with the Ganges. It is capital of the district of Saran. Population, 51,670.

CHAPTER-HOUSE. See *Britannica*, Vol. II, p. 462.

CHAPULTEPEC, a rock two miles southwest of the City of Mexico, rising to a height of 150 feet, and crowned by a castle which was erected by the Spanish viceroy in 1785 on the site of the palace of Montezuma.

CHARACEÆ, aquatic plants, nearly allied to the *Algae*, and consisting of slender-jointed stems. They grow in stagnant waters, both fresh and salt, are always submerged, and often completely conceal muddy bottoms.

CHARACTER, that which is engraven on an object, either physically, by action of another external object or objects, or morally, by the passions, the affections, by good or evil fortune, and by what we designate generally as "circumstances." In art, the expression of character either in animate or inanimate objects, is, after correct delineation, the most important matter to be attended to.

CHARADRIADÆ, a large family of birds, of the order *Grallatores*, and tribe *Pressirostres*. Besides the plovers, the family includes the lapwings, oyster-catchers, sanderlings, etc.

CHARBON ROUGE, or RED CHARCOAL, a variety of charcoal obtained by subjecting wood to the action of heated air from furnaces, or of steam, which has been raised to a temperature of 572° F.

CHARCOAL BLACKS are made both from animal and vegetable substances. Those which are derived from vegetable substances, when mixed with white, are usually of a blue tint.

CHARENTE, a river in the west of France. This river gives its name to two departments, both remarkable for the productiveness of there vineyards.

CHARGE, in heraldry, a term given to the figures represented on a shield, and one thus adorned is said to be charged.

CHARGE, in military warfare, a sudden and impetuous attack on the enemy.

CHARGE, in military pyrotechny, sufficient combustible material for one firing or discharge. It is

also applicable to all kinds of firings, fireworks and explosions.

**CHARGE**, the exposition of the law made by the judge to the jury, in which he comments on the evidence and instructs the jury as to the application of the law to the facts.

**CHARGÉ D'AFFAIRES**, a fourth-class diplomatic agent, accredited, not to the sovereign, but to the department for foreign affairs; he also holds his credentials only from the minister.

**CHARGER**, a name sometimes given to a war-horse accustomed to the din of battles, and reliable under circumstances of confusion and danger. See *Britannica*, Vol. XII, p. 191.

**CHARITIES**, in law, are grants or devises for the benefit of the poor or friendless, for public institutions, or for education or religious culture.

**CHARITON**, a city and the county-seat of Lucas county, Iowa, situated on the Chariton River and the Chicago, Burlington and Quincy railroad.

**CHARITY**, **SISTERS OF**, nuns who are devoted to the temporal and spiritual care of the poor and the sick.

**CHARIVARI**, a French term used to designate a wild tumult, and uproar produced by the beating of pans, kettles, dishes, mingled with hissing, whistling, etc., for the purpose of expressing a general dislike to the person against whom the mock serenade is directed.

**CHARLATAN**, a quack-doctor, or empiric, or in fact any one who makes loud pretensions to knowledge or skill which he does not possess.

**CHARLES**, **ELIZABETH RUNDLE**, writer of several well-known historical novels, born about 1826. Among her most popular works are the *Chronicles of the Schönberg-Cotha Family* and the *Diary of Kitty Trevelyan*.

**CHARLES CITY**, a railroad junction and the county-seat of Floyd county, Iowa, on the Cedar River. It has various manufactories, among which is one for furniture.

**CHARLES'S WAIN**, the constellation of Ursa Major, also popularly known as "the plow," and "the dipper."

**CHARLESTON**, a city and county-seat of Cole county, Ill., 48 miles west of Terre Haute. It has an infirmary and a medical college. Pop., 4,135.

**CHARLESTON**, a city of South Carolina, and county-seat of Charleston county (see *Britannica*, Vol. V, p. 423-29). The trade of the city for the year 1889 amounted to \$80,000,000, an increase of \$4,000,000, over that of the previous year. The imports for 1889 were \$683,232 and exports \$13,807,675. Manufacturing industries numbered 360, with \$9,000,000 capital, producing \$13,742,879. The phosphate industry is the chief, the trade in phosphate fertilizers alone amounting to \$5,494,650, as against \$2,612,660 in 1887. The supply of water is obtained from three artesian wells, the third and largest of which was completed in 1889. The daily supply is 2,000,000 gallons. Public schools and libraries have advanced with the population and wealth of the city, and a new post office and custom house have been added to the public buildings. Population in 1880, 49,984; in 1890, 54,592.

**CHARLESTON**, or **KANAWHA COURT-HOUSE**, the capital of West Virginia, and the county seat of Kanawha county, situated on the Elk and Kanawha Rivers. A large amount of manufacturing and shipping is done in this city. Ice, furniture, doors, blinds, wagons and iron fences are made; there are dry docks and ship-building yards, many fine public buildings, water, gas, and electric-light works. Great quantities of salt are daily manufactured. In 1869 this city was the State capital; in 1875 Wheeling became the capital; in 1885

Charleston was again made the capital. Population in 1890, 2,287; township, 4,524.

**CHARLESTOWN**, a manufacturing town of Sullivan county, N. H., on the Connecticut River, fifty miles west of Concord. It has manufactories of boots, shoes, and lumber.

**CHARLESTOWN**, a railroad town and the county-seat of Jefferson county, W. Va. It is near Harper's Ferry. John Brown was tried and executed at Charlestown, Dec. 2, 1859.

**CHARLOIS**, a village of the Netherlands, situated on the Maas, about two miles southwest of Rotterdam. It is memorable on account of a terrible accident which occurred here in 1512. A religious procession, crossing the ice in defiance of magisterial prohibition, was precipitated into the Maas, and 8,000 lives were lost.

**CHARLOTTE**, a railroad city and county-seat of Eaton county, Mich. Lumber and flour are here manufactured. Population in 1890, 3,867.

**CHARLOTTE**, a city and county-seat of Mecklenburg county, N. C., situated on Sugar Creek, 110 miles north of Columbia, the capital of S. C. It is an important station of the Atlanta and Richmond Air-line Railroad, and terminus of the Charlotte, Columbia and Augusta, and the Atlantic, Tennessee and Ohio Railroads. The court-house is a substantial and commodious structure. The Biddle (Presbyterian) University was organized here in 1867. In 1838 a branch mint was established in Charlotte for the coinage of gold found in the vicinity. The principal manufactories are of carriages, machinery, cotton goods, agricultural implements, tobacco, and iron castings. Population in 1880, 7,094; in 1890, 11,555.

**CHARLOTTE AMALIE**, a town of the island of St. Thomas, the seat of government of the Danish West Indies. It has an excellent harbor, and an extensive trade. Population, 13,000.

**CHARLOTTESVILLE**, Virginia. See *Britannica*, Vol. V, p. 430. Population in 1890, 5,591.

**CHARM**, a form of words, generally in verse, supposed to possess some supernatural power, of a hurtful, a healing, or a protective kind.

**CHARNEL HOUSE**. See Vol. II, p. 462.

**CHARNOCK**, **STEPHEN**, born in London, England, in 1628, died in 1680. He was a Puritan divine. His principal literary work was a *Treatise on the Attributes of God*.

**CHARON**. See *Britannica*, Vol. V, p. 430. In the folklore of modern Greece, Charon still survives as a kind of shadowy representative of death and a mysterious under-world.

**CHART**, a marine or hydrographical map exhibiting a portion of a sea or other water, with the islands, coast of contiguous land, surroundings, currents, etc.

**CHARTÉ**, a charter or system of constitutional law, embodied in a single document. The first such charter in France is known as the *Grande Charte*, or the Charter of King John (1215). But the constitution to which the term *charte* is most frequently applied is that in which Louis XVIII solemnly acknowledged the rights of the nation on his restoration in 1814. This *charte* has ever since been considered the fundamental law of constitutional monarchy when that form of government has existed in France.

**CHARTER**. See *Britannica*, Vol. V, pp. 431-33.

**CHARTER-HOUSE**, a charitable hospital, chapel, and celebrated public school in London, founded in 1611 by Sir Thomas Sutton. It had been originally a Carthusian monastery. See *Britannica*, Vol. I p. 20; Vol. XIV, p. 835.

**CHARTER PARTY**. See *Britannica*, Vol. V, p. 433.



**CHARTULARY**, or **CAETULARY**, a collection of charters. As soon as a body, ecclesiastical or secular, possessed a considerable number of charters they were classified and copied into a book or roll, called a chartulary; the officer in the ancient Latin Church who had charge of the records was also called a cartulary.

**CHARTERS TOWERS**, a mining township of Northeast Queensland, Australia, situated on the northern spurs of the Towers Mountain, 820 miles northwest of Brisbane. It dates from the gold discovery here of 1871-72, and was incorporated in 1877. It has railway connection with Townsville on the coast. Population of town, 3,313; with district, 7,310.

**CHASE**, in a gun, the name given to the greater portion of the length between the muzzle and the trunnions.

**CHASE, PHILANDER**, P. E. bishop, born in Cornish, N. H., Dec. 14, 1775, died at Jubilee College, Ill., Sept. 20, 1852. He graduated in 1795 at Dartmouth College, and three years later was ordained priest of the Protestant Episcopal church. He held rectories in New Orleans, La., and in Hartford, Conn., and in 1817 undertook missionary work in Ohio, where for a time he preached for three churches and took charge of the Worthington Academy. He twice visited England, obtained funds for educational works and therewith erected Kenyon College, Gambier Theological Seminary, and Jubilee College—the latter in Illinois. In 1819 Mr. Chase was consecrated bishop of Ohio and in 1835 bishop of Illinois. Two volumes of *Reminiscences* and two works concerning Kenyon College are among his publications.

**CHASE, PLINY EARLE**, scientist, born at Worcester, Mass., Aug. 18, 1820, died Dec. 17, 1886. He graduated at Harvard in 1839, taught in Philadelphia, engaged in mercantile pursuits, but employed his leisure in scientific and philosophical pursuits. In 1871 he became professor of logic and philosophy in Haverford College, and further pursued his investigations in the fields of electricity, gravity, magnetism and kindred forces. His scientific papers were widely published, and he received the Magellanic gold medal of the American Philosophical Society in 1864.

**CHASE, SALMON PORTLAND**, statesman and jurist, born in Cornish, N. H., Jan. 13, 1808, died in New York city, May 7, 1873. His father was Ithamas Chase, and the stock to which he belonged was prolific in eminent men. When the boy was eight years old the family removed to Keene, N. H., and soon after the father died. An uncle who was bishop of Ohio in 1820 offered the boy a home, and educational advantages in the academy of which the uncle was principal. Here he spent three years, and in 1824 entered Dartmouth College, graduating in 1826. He then went to Washington, D. C., opened a classical school for boys, and meantime studied law under William Wirt. After receiving his license to practice he went (1830) to Cincinnati, where he opened a law office, and while waiting for clients edited the *Statutes of Ohio* with notes; this drew public attention, and in 1834 he was appointed solicitor of the U. S. bank in that city. He very soon connected himself with the anti-slavery party, and defended so many fugitive slaves that Kentuckians called him the "attorney-general for runaway negroes."

Mr. Chase defended Van Zandt, who was charged with harboring fugitive slaves. "Slavery is sectional, freedom is national," was the maxim of this jurist, and he felt called by providence to devote his time and means to the upbuilding of the party of constitutional freedom. Mr. Chase became ul-

timately a founder of the Republican party. In the Liberal and Free-Soil conventions from 1841-48, he was the leading spirit, and allied himself with whatever party would at the time further his aims. The Democrats in 1849 elected him to the U. S. Senate, and here he distinguished himself by his firm stand against slavery.

In 1850, seeing the attitude of the Democratic party on the slavery question Mr. Chase left it, and in 1855 was elected by the Whigs governor of Ohio; two years later he was reelected. At the Republican national convention which nominated Mr. Lincoln, he was a prominent candidate for the presidency. In 1861 he was again in the Senate, but President Lincoln called him to the cabinet as Secretary of the Treasury. In this office his duties were not arduous; the Government credit was below par; the treasury was empty, and in this state of finances a war must be carried on. Secretary Chase negotiated a loan for \$8,000,000, recommended confiscation of property belonging to those in rebellion, increase of duties, and a national currency with a system of national banking associations. Treasury notes, "greenbacks," were issued, and served to tide the government over the financial crisis.

The secretaryship was resigned by Mr. Chase in 1864, and a few months later the President nominated him as chief justice of the United States, and it was in this capacity that he presided at the impeachment of President Johnson in 1868. In 1864 his name had been brought forward as Republican nominee for the presidency, and in 1868 the Democratic party named him for the honor; but he did not command a large following at the convention.

**CHASE, SAMUEL**, Signer of the Declaration of Independence, born in Somerset county, Md., April 17, 1741, died June 19, 1811. He was a lawyer by profession, an ardent patriot, a member of the Continental Congress from 1774 to 1778, and was one of a committee sent by Congress to urge Canada to unite with the colonies in resistance to England. After the war he was the agent sent to recover from the bank of England money deposited there by Americans before the war. In 1788 he became member of the Maryland convention which adopted the Federal Constitution, and three years later chief justice of the General Court of Maryland. On the occasion of a riot in 1794 he ordered the arrest of two rioters and assisted in taking them to jail. For this act John Randolph secured his impeachment five years after, when he was an associate justice of the U. S. Supreme Court. The Senate acquitted him of the charge.

**CHASE, THOMAS**, educator, brother of Pliny Earle Chase, scientist, born in Worcester, Mass., June 16, 1827; graduated at Harvard in 1848, taught in the institution from 1850 to 1853, studied abroad; in 1855 became professor at Haverford College, near Philadelphia, and its president in 1875. He was one of the American revisers of the New Testament. He has edited and published works on the classics.

**CHASIDIM**. After the Babylonish captivity, the Jews, with regard to their observance of the law of Moses, were divided into two classes—*Chasidim* and *Zadikim*. When the Great Synagogue was commissioned by the Persian government to draw up a code of civil and religious laws for the emigrant Jews, several innovations were made on the Mosaic law. Those who accepted these innovations were styled Chasidim, while those who rejected them were styled Zadikim. See *ASSIDEANS*, *Britannica*, Vol. II. p. 729.

**CHASING**, the art of working raised or half-raised figures in gold, silver, bronze or other metal (see *Britannica*, Vol. VIII, p. 189). The art was known at a very early period, as may be inferred from the shield of Achilles, the ark of Cypselus, and other productions of this kind.

**CHASKA**, the county-seat of Carver county, Minn., on the left bank of the Minnesota River, thirty-two miles southwest of St. Paul. The Minnesota and St. Louis Railroad here forms a junction with the Hastings and Dakota Railroad, while on the opposite side of the river is the Chicago, St. Paul, Minneapolis and Omaha Railroad.

**CHASLES, MICHEL**, a French mathematician, born at Epernon in 1793, died in 1880. His principal works are a *History of Arithmetic*, and treatises on *Higher Geometry* and on *Conic Sections*.

**CHASLES, PHILARETE** (1798-1873), a French writer, born at Mainvilliers, near Chartres, Oct. 8, 1798. Early imbued with Rousseau's ideas by his father, he was apprenticed at fifteen to a Jacobin book-seller, with whom he was sent to jail after the restoration. Released by Chateaubriand's influence he went to England, where he found employment in a book-seller's shop, and during his seven years' residence laid the foundation of his large knowledge of English literature. After his return to France he contributed reviews of English books to the *Revue Encyclopédique*. In 1824 he published *Discours sur Jacques Auguste de Thou*, and in 1828 *Tableau de la Langue et Littérature Française, 1500-1610*. In 1837 Chasles became librarian of the Bibliothèque Mazarin, and in 1841 professor of Northern Languages at the Collège de France, which chair he filled until his death at Venice, July 18, 1873.

**CHASSE**, music composed in imitation of the chase, and produced chiefly by horns, occasionally combined with other wind instruments.

**CHASSE, DAVID HENDRICK, BARON**, a Dutch soldier, born in Thiel, in the Netherlands, in 1765, died in 1849. He began his military career at ten years of age. At sixteen he was lieutenant, and in 1787 became captain. He entered the French service, and for his fondness for bayonet charges Napoleon gave him the name of "General Bayonet." Louis Bonaparte made him a baron in 1809, and in 1815 he fought at the head of the Dutch forces against his old comrades, the French. As governor of Antwerp he defended the citadel bravely for three weeks against the Belgians and French. He died in 1849.

**CHASSEPOT, ANTOINE ALPHONSE**, a French inventor, born March 4, 1833. He was an employé in the Paris arsenal of St. Thomas, where he became an official in 1858, and in 1863 brought before the government the model of his rifle, adopted three years afterwards.

**CHASSEURS**, a name give to some light troops in several of the European armies. In 1815, battalions of chasseurs were enrolled in the French army. The name is now generally applied to one of a body of light troops designed for rapid movements.

**CHASSEURS DE VINCENNES**, one of the names given to a famous corps in the French army. In 1835, when certain improvements had been made in the French rifle, the Duke of Orleans ordered the formation of a company of riflemen, armed with new rifles. They proved so efficient that in 1838 a whole battalion was organized, which was called the *Chasseurs de Vincennes*.

**CHASTELLUX, FRANÇOIS JEAN, MARQUIS DE**, a French author, born in Paris in 1734, died there Oct. 28, 1788. He served during the American Revolution under Rochambeau, securing the friend-

ship of Washington and Jefferson. He wrote *Travels in America*, and an *Essay on Public Happiness*, a work which denounced Christianity.

**CHASUBLE**, the uppermost garment worn by Roman Catholic priests, when robed for the celebration of the mass. See *Britannica*, Vol. VI, p. 462.

**CHAT**, a genus of birds of the thrush family. There are many species, chiefly African. The yellow-breasted chat of the United States is remarkable for the volubility and mimicry of its song. See *Wheatear* *Britannica*, Vol. XXIV, p. 537.

**CHATEAU**, a castle or a fortress in France. A manor house; a gentleman's country-seat; also a royal residence; as, the *château* of the Louvre. The distinctive French term for a fortified castle of the Middle Ages is *château-fort*.

**CHATEAU-GONTIER**, a town in the French department of Mayenne, situated on the Mayenne, 180 miles southwest of Paris by rail. It has linen and woolen manufactures. Population, 7,334.

**CHATELAINE**, the wife of the châtelain or castellan; the mistress of a castle or château. Also a chain worn by the castellan, depending from the girdle, to which the keys of the castle were attached. From this use of the term we have the application to a modern device consisting of an ornamental hook or clasp, worn by a lady at her waist, and having a chain attached for a watch, keys, trinkets, etc. Also applied to the trinkets themselves, and used adjectively, as *châtelaine* watch, belt, etc.

**CHATHAM**, a town and county-seat of Kent county, Ontario, on the Thames River, and the Great Western Railroad, 45 miles east of Detroit, Mich. It manufactures machinery and woolen goods, and has a large trade in lumber, potash, tobacco, soap, etc.

**CHATHAM**, a town of Barnstable county, Mass., on the Atlantic, at the southeastern point of Cape Cod. It is a summer resort, has good schools and two light-houses.

**CHATHAM VILLAGE, CHATHAM FOUR CORNERS**, a thriving village of Columbia county, N. Y. It has cotton and paper-mills, blast furnaces and machine shops. It is a junction for the Boston and Albany, the New York and Harlem, and the Harlem Extension Railroads.

**CHATI**, a small leopard-like cat (*Felis mitis*), found in South America.

**CHATTAHOOCHEE**, a river of Georgia, about 500 miles long, and navigable for small boats for 325 miles. It rises in the Blue Ridge, in the northeast part of the State, flows south, forming the boundary between Georgia and Alabama, and unites with Flint River to form the Appalachicola.

**CHATEL**, every species of property, movable or immovable, which is less than a freehold. Real chattels are interests which are annexed to or concern real estate; as, a lease for years of land. Personal chattels are properly things movable, which may be carried about by the owner; such as animals, household stuff, money, corn, jewels, furniture, garments and everything else that can be put in motion and transferred from one place to another. Chattels, whether real or personal, are treated as personal property in every respect, and in case of the death of the owner, usually belong to the executor or administrator and not to the heir at law.

**CHATTANOOGA**, a city of Tennessee, and county-seat of Hamilton county, located near the southern boundary of the State, on the south bank of the Tennessee River, at the mouth of a valley formed by Mission Ridge on the east and Lookout Mountain on the west. Although it received a city charter in 1851 its population in 1860 was only 2,545. The civil war wiped out the commerce and indus-



tries of the little city, and it became a great depot of war supplies. The surrounding hills, valleys and plains were camps, and hospitals and tents filled the town. But with the close of the war came a remarkable growth. In 1890 the city contained 300 manufacturing establishments; several large hotels; street railways, both horse and electric; gas and electric lights, water-works, large jobbing houses, and elegant private residences. Chattanooga has nine trunk lines of railway. The United States government has expended \$4,000,000 in removing obstructions from the Tennessee River, and the river traffic is immense. A new bridge of steel and iron, built by the county at a cost of \$225,000, now spans the river at this point, and is free for carriages and foot passengers. The city is supplied with water taken from the river above the city, pumped through 63 miles of mains, with a capacity of 20,000,000 gallons daily. The Grant Memorial University (Methodist) is located here, and includes a classical school, medical school, law school, theological school, and the preparatory departments. Other educational institutions are the Notre Dame de Lourdes, in charge of the Dominican Sisters, numerous public schools, and a commercial college. The great bend of the river, sweeping around the city, gives 11 miles of deep water front, and supplies unusual transportation facilities for the manufacturing and commercial establishments. Iron ore abounds in the vicinity, and 300 tons of iron are produced daily by the smelting and puddling works in the city. Population in 1880, 12,879; in 1890, 29,113.

**CHATEL MORTGAGE**, a mortgage on personal property.

**CHATTERER**, a popular name applied to the birds of the family *Ampelidae*, of the order *Incesores* and tribe *Dentirostres*. They are found chiefly in the warmer regions. Some of them possess powers of song almost equal to those of the nightingale. See WAXING, Britannica. Vol. XXIV, p. 460.

**CHAUDFONTAINE**, a village situated in the valley of the Vesdre, a few miles from Liège, in Belgium. Population, about 1,600.

**CHAUMONOT, PIERRE JOSEPH MARIE**, a Jesuit missionary, born near Chatillon-sur-Seine, France, in 1611, died near Quebec, Feb. 21, 1693. He labored among the Canadian Indians, and wrote a grammar of the Huron language.

**CHAUNCEY, ISAAC**, commodore U. S. N., born at Black Rock, Conn., Feb. 20, 1772, died in Washington, D. C., Jan. 27, 1840. At an early age he went to sea, and before he had completed his twentieth year he commanded a ship in the merchant service which belonged to John Jacob Astor. When the navy was organized in 1798, Chauncey was appointed lieutenant and rose to be captain in 1806. In the war with Tripoli he served with gallantry. During the war of 1812 Capt. Chauncey commanded on the lakes, superintended the building of a fleet, cooperated in the capture of York (Toronto), and put to flight the British fleet in York bay. After the war he commanded the Brooklyn navy-yard, negotiated a treaty with Algiers while commanding the Mediterranean squadron, and at the time of his death was president of the Board of Navy Commissioners at Washington.

**CHAUNCEY, CHARLES**, educator, born in Yardlebury, Hertfordshire, England, in 1592, died in 1672. He graduated at Cambridge in 1613, and afterwards taught Hebrew and Greek there. He became a clergyman, but so strong were his Puritan convictions that he was continually in trouble with the higher church authorities. In 1638 he found in New England the liberty of conscience denied in Old England. The church of Scituate called him

to be its pastor, and here he remained for 12 years, at the end of which time he made ready to return to England to his old congregation of Ware; but Harvard College was just then without a president, and he accepted the office which was offered, serving acceptably up to the time of his death. He was the second president of Harvard, and held the office for 18 years.

**CHAUSSES**, in the armor of the Middle Ages, defense pieces for the legs. Some were made of padded and quilted cloth and some of riveted plates.

**CHAUTAQUA**, an unique summer resort in Chautauqua county, N. Y., on Chautauqua lake. It was formerly called Fair Point, and was a favorite place for Methodist camp-meetings, but in 1874 the grounds were purchased by the Chautauqua Sunday-school Assembly. Many lots have been purchased, upon which neat cottages have been erected; there are also numerous boarding-houses and hotels, and large pavilions for religious services and instruction. Each year, during July and August, summer schools of language and art are held there, popular lecturers being secured to address the large classes. Crowds of people annually throng the Chautauqua grounds. Sunday-school and temperance work, as well as Bible study, receive attention. The "Chautauqua Idea" has become popular, and there are branch "Chautauqua Assemblies" in many of the States and in Canada.

**CHAUTAQUA LAKE**, in Chautauqua county, N. Y., a picturesque sheet of water, 18 miles long and three miles in breadth at its widest point. It is the highest navigable water in the United States, being 726 feet higher than Lake Erie. Steamers sail between Mayville and the flourishing town of Jamestown, which lies at the opposite end of the lake. The Indian name means "bag tied in the middle," and refers to the fancied shape of the lake.

**CHAUTAQUA LITERARY AND SCIENTIFIC CIRCLE**, an incorporated institution for study and instruction, suggested and largely promoted, by Hon. Lewis Miller, of Akron, Ohio. It was organized in 1878, at Chautauqua, N. Y., with Lewis Miller as President of the Association, and Rev. John H. Vincent, D. D., LL. D. (now a bishop of the Methodist Episcopal Church) as chancellor of the faculty. The purpose of the Circle is to promote habits of reading and study in Nature, art, science, and in secular and sacred literature, in connection with the routine of daily life; to give college graduates a review of the college course; to secure for those whose educational advantages have been limited the college student's general outlook upon the world and life, and to develop the habit of close, connected, persistent thinking.

It endeavors to encourage individual study in lines and by text-books which shall be indicated; by local circles for mutual help and encouragement in such studies; by summer courses of lectures and "students' sessions" at Chautauqua, and by written reports of each year's work.

Any person may join the circle upon payment of the annual membership fee, which is fifty cents. No entrance examination is necessary. Persons may enter for one year, but the full course is four years, after which the graduate receives a diploma. The course of studies is directed from the center of the Circle, and may be pursued at home and in the local circles. Attendance at the summer meetings at Chautauqua, N. Y., is urged, but is not imperative. The meeting of 1890 began July 5 and closed August 25.

There are over fifty Chautauqua assemblies, in the United States, Canada, Great Britain, Japan.

India, South America, Australasia, and South Africa, with a membership of half a million persons. All are modeled in organization and methods upon the original Chautauqua Assembly, but are independent in management. Dr. Jesse L. Hurlbut is Principal of the Faculty at Chautauqua, and A. M. Martin, of Pittsburgh, is Secretary. The general secretarial office is in Buffalo, N. Y., with Miss K. F. Kimball in charge.

CHAUVEAU, PIERRE JOSEPH OLIVIER, a Canadian statesman, born in Quebec, May 30, 1820. Educated at the seminary of Quebec, he afterwards studied law and was admitted to the bar in 1841, and three years later entered political life as a reform member for the county of Quebec. In 1851 he was solicitor-general for Lower Canada; in 1853 provincial secretary and member of the executive council; he was superintendent of education for his native city in 1855; and, after the confederation was elected to the Dominion House of Commons and the Quebec House of Assembly. He held the office of premier from 1867 to 1873, was speaker of the Senate in (1873-74), became president of Quebec harbor commission in 1876, and sheriff of Montreal in 1877. Mr. Chauveau has done much for the educational cause, and his writings in prose and poetry have been received with favor.

CHAUVENET, WILLIAM, an American mathematician, born at Milford, Pa., in 1820, died in 1870. He was one of the founders of the United States Naval Academy. He wrote many valuable works on mathematics, and originated numerous improvements in mathematical methods.

CHAY ROOT, CHOYA, or SAYAN, a perennial herbaceous plant of the natural order *Cinchonaceae*, a native of India and Mexico. It is cultivated for the sake of its orange-colored roots, whose bark affords a beautiful red dye.

CHAYENPUR, a fortified town of Nepal, in the north of India. It is the chief town of a district which yields rice, wheat, cotton, butter, timber, spices, sugar, tobacco and pearls.

CHAZARS, a people of the Finnish stock known in the seventh century on the shores of the Caspian; in the ninth century their kingdom occupied the southeast of Russia from the Caspian and the Volga to the Dnieper. They were singularly tolerant of all religions; a large part of the nation adopted the Jewish faith from Jews who fled from the persecutions of Emperor Leo, and Cyril converted many to Christianity in the ninth century. The power of the Chazars was ultimately broken in the 12th century by the Byzantine emperors and the Russians.

CHAZY EPOCH, the name given by American geologists to that division of Silurian time during which the Chazy limestone of New York, Canada, etc., was formed.

CHEATHAM, BENJAMIN F., a soldier, born in Davidson county, Tenn., Oct. 20, 1820, died at Nashville, Tenn., Sept. 4, 1886. He achieved distinction as a captain and colonel of volunteers during the war between Mexico and the United States, at the conclusion of which he became major-general of the Tennessee militia. He pursued the occupation of farmer till 1861, at which time, under a call from the Governor of Tennessee, he enlisted in the military service of the State, was appointed a brigadier-general, and was soon afterward transferred with his command to the military service of the Confederate States, in which he continued till the close of the war, rising successively to the grades of major and lieutenant-general. He distinguished himself at the battle of Belmont in 1861, and commanded a division in Gen. Bragg's army in his campaign into Kentucky in 1862. He participated in the battles of

Perryville, Stone River, Chickamauga Missionary Ridge, Resaca, Marietta, in the battles near Atlanta, in the battle of Jonesboro, Ga., Franklin and Nashville, Tenn., in which he commanded an army corps as lieutenant-general, and also in the battle of Bentonville, N. C., soon after which he surrendered to the Federal forces with that portion of the Confederate army commanded by Gen. Joseph E. Johnston. At the conclusion of the war between the States he returned to the vocation of agriculture.

In 1872 he was nominated by the Democratic State convention to represent the State at large in the United States Congress; but Andrew Johnson becoming an independent candidate for the same office the Democratic vote was thus divided between him and Cheatham, and the contest resulted in the election of Horace Maynard, the Republican candidate.

He was subsequently appointed superintendent of State prisons, in which capacity he served four years. In 1885 he was appointed by President Cleveland postmaster at Nashville, Tenn., and died in the incumbency of that office. He was noted for his sound practical judgment, great personal courage, and firm fealty to his friends. He was one of the most popular and successful commanders in that portion of the Confederate forces known as the "Army of Tennessee," which was first commanded by Gen. Albert Sidney Johnston and successively by Gens. Beauregard, Bragg, Joseph E. Johnston and J. B. Hood.

CHEBOYGAN, the county-seat of Cheboygan county, Mich., on a river of the same name and on Lake Huron. It has saw, planing and grist-mills; also a large grain trade. Population in 1890, 6,235.

CHECK, a fabric whose pattern consists of rectangular spaces like a chessboard.

CHECK, or CHEQUE. See Britannica, Vol. V, pp. 583-84.

CHECKY, in heraldry, when the field or any charge is composed of small squares of different tincture, generally metal and color, it is said to be checky.

CHEDDAR, a village in Somersetshire, two miles southeast of Axbridge, England, celebrated for the production of the Cheddar cheeses. Population, 2,200.

CHEESE-HOPPER the larvæ of *Tyrophagacasei*; a small dipterous fly of the family *Muscidae*, the same to which the house-fly, blow-fly, etc., belong. It lays its eggs in the crevices of cheese, the destined food of its larvæ, and is, therefore, a special pest of dairies.

CHEEVER, GEORGE BARRELL, clergyman and author, born in Hallowell, Me., April 17, 1807, died at Englewood, N. J., Oct. 1, 1890. He was a graduate of Bowdoin in 1825, of Andover seminary in 1830, and became pastor of a Congregational church in Boston. He was an active controversialist, writing against Unitarianism in *A Defense of the Orthodoxy of Cudworth*, against intemperance in an allegory entitled *Inquire at Deacon Gile's Distillery*, and against slavery, the operation of railroads on Sunday, the banishment of the Bible from public schools, and other questions of popular interest. His tract on temperance produced great excitement, and he was tried for libel and imprisoned. He traveled in Europe, and while there contributed letters to the "New York Observer;" on a second trip he was corresponding editor of the "New York Evangelist." In 1839 he became pastor of Allen street Presbyterian church in New York city, and from 1846 to 1870 had charge of the Church of the Puritans, which was organized for him. He was the writer of many books on religious, social and literary topics, his best work being *Lectures on the Pilgrim's Progress*.<sup>17</sup>



**CHEIROLEPIS**, a genus of fossil ganoid fish peculiar to the Devonian measures, in which eight species have been found. They had minute scales and greatly developed pectoral and ventral fins.

**CHEIROMANCY**, or **PALMISTRY**, a form of divination that professes to read the destiny of an individual by the lineaments of the hand.

**CHEIROTHERIUM**, a name given to the animal which produced the peculiar hand-like impressions on the Triassic rocks in England and Germany.

**CHEIRONECTES**, a genus of marsupial quadrupeds, differing from the opossum chiefly in having webbed feet and aquatic habits. It is sometimes known as yapock from the South American river of that name. It is common in many rivers of Brazil and Guiana.

**CHE-KEANG**, a maritime province of China. See *Britannica*, Vol. V, p. 636.

**CHELICERÆ**, the biting organs forming the first pair of appendages in spiders, scorpions and other arachnida, and answering the same purpose as the mandibles of insects.

**CHELIUS**, **MAXIMILIAN**, born at Mannheim, Germany, in 1794, died in 1876. He was a physician and surgeon of distinguished ability. His *Handbook of Surgery* is a standard work, and has been translated into many languages.

**CHELMSFORD**, **FREDERICK THESIGER**, **BARON**, born in London in 1794, died Oct. 5, 1878. He was a midshipman in the navy, but studied law, and was called to the bar in 1818; was made solicitor-general in 1844, attorney-general in 1845 and 1852, and lord chancellor, with the title of Lord Chelmsford, in 1858 and in 1866.

**CHELMSFORD**, **FREDERICK AUGUSTUS THESIGER**, second Baron, born in 1827, entered the rifle brigade in 1844, became major in the Grenadier Guards in 1855, and served through the Crimean war, the Indian mutiny, and the Abyssinian campaign of 1868. He was adjutant-general in Bengal (1869-74), and commanded the forces in the Kafir war of 1878 and in the Zulu war of 1879, having resigned the governorship of Cape Colony. Appointed lieutenant-general in 1882, he was made lieutenant of the Tower of London in 1884.

**CHELONIA**, an order of reptiles including the various forms of tortoise and turtle (see *Britannica*, Vol. XXIII, p. 455).

Their distinctive characteristic is the more or less complete inclosure of the body by a dorsal and a ventral shield, of which the former is in part due to a modification of the vertebral spines and of the ribs. Within these shields the head, limbs and tail can be more or less retracted. The absence of teeth is also characteristic. The *Chelonia* include marine, freshwater, and terrestrial forms. The known living species number about 260, the majority occurring in warm countries; they are represented by numerous fossil forms from the Upper Jurassic onwards.

**CHELSEA**, a city of Massachusetts. For its historic description, see *Britannica*, Vol. V, p. 458. The manufactures of the city are many and important, the chief being an elastic-rubber factory, chemical works, factories for making sewing machines, brassware, linseed oil, safes, woolen goods, brushes and tools. Population in 1890, 27,909.

**CHELSEA HOSPITAL**, an asylum for old and disabled soldiers of the British army. The foundation stone was laid by Charles II in 1682, and the building, designed by Wren, was opened in 1692. The funds for its lands and buildings, and for many years the maintenance of its inmates, were derived chiefly by deductions from the pay of the troops themselves.

**CHELYUSKIN**, **CAPE**, formerly North-East Cape, and sometimes called Cape Severo, the most northerly point of Asia, on a peninsula of the same name. It is a low promontory, divided into two parts by a small bay; the latitude of the western part is 77° 36' 37" north, that of the eastern 77° 41' north. It is named after a Russian officer who led an expedition thither far in 1742; it was not revisited till 1878, when Nordenskjöld, in the *Vega*, spent the 19th and 20th of August here.

**CHEMIC**, the common name given to bleaching powder by those engaged in chemical works.

**CHEMICAL AFFINITY**, the name applied to that peculiar force which causes elementary atoms, or groups of atoms, to unite; or to the force by which the substances constituting a compound are held together.

**CHEMICAL ANALYSIS**. See *Britannica*, Vol. V, pp. 459-579. See also *Britannica*, Vol. I, pp. 795, 796.

**CHEMISTRY**, **RECENT DISCOVERIES IN**. (For general article on **CHEMISTRY**, see *Britannica*, Vol. V, pp. 459-579.) In recent years no less than thirty-one new elementary bodies have been discovered and announced to the learned world. Some have been buried as the result of scientific investigation, and concerning some of the survivors much is yet to be learned. The extreme rarity of the minerals in which the new elements have been detected; the excessively small percentages of the new ingredients, and the extraordinary difficulties attending their separation from known substances, combine to render the investigations laborious, protracted and costly. The extreme value, however, of some of the discoveries has caused an intense interest in the learned world, and chemists in every civilized nation have vied with one another to accomplish new and important results. The following is a list embracing some of the more important substances and compounds, and new uses of old substances and old compounds discovered:

**ALUMINIUM**, or **ALUMINUM**, a white metal, the base of alumina. In nature aluminium is not found in a separate or metallic state. It was formerly very rare and cost as much

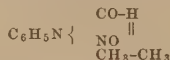
as gold, but as a result of recent discoveries the price has been greatly reduced. Until very late years it was imported from Greenland, being obtained from the mineral cryolite, a double fluoride of aluminium and sodium. Its chemical symbol is Al, and atomic weight 27. To Sir H. Davy is awarded the honor of its discovery, although it is claimed by some that Wöhler is entitled to the credit. As a mineral it is remarkably light, being but about one-third the weight of iron. Recent investigations have verified the fact that in combination with oxygen it forms the common earth alumina ( $Al_2O_3$ ), the most abundant of the earths as diffused over the globe in the shape of clays, loams, and similar substances. It has also been discovered that it enters largely into the composition of a great number of minerals, principal among which are the feldspars, from whose decomposition are the many forms of clay (kaolin, etc.); also a large number of silicates, as the andalusite, cyanite, fibrolite, topaz, etc. In its various compounds it is estimated that it forms fully one-twelfth of the crust of the earth, and on account of its abundance, its lightness of weight, freedom from tarnish, ease in working, and its non-poisonous qualities, every effort is being made to reduce the cost of its production. It has heretofore been used, to a limited extent, by itself, and in alloys in many articles where great strength and extreme lightness were both required.

An alloy of nine parts of copper to one of aluminium resembles gold in luster and color, and is much used in the manufacture of cheap jewelry, ornamental work, and for various industrial purposes. Three per cent. of silver mixed with aluminium gives the alloy the color and brilliancy of pure silver, and while silver is tarnished by sulphureted hydrogen, the alloy remains unchanged. An alloy made of

gold, silver, copper, and for soft solder a little zinc is used in soldering bronze. While it can enter largely into the mechanic arts, it cannot be used for cooking utensils, because it dissolves easily in organic acids in the presence of chlorides. It has proved especially valuable in the manufacture of fine wire lace, certain surgical instruments, suture wire, dental plates, etc., and on account of its remarkable strength aluminium-brass has been selected by the government of the United States as the best material for the propeller blades of the war vessels in course of construction. It has also been found especially applicable for gun barrels.

As an evidence of the remarkable advance that has been made in its production, as well as in lessening its price, it is officially stated that in 1885 the price of the metal was quoted at from 75 cts. to \$1.25 per Troy ounce. In that year works were established in Cleveland, Ohio, and Lockport, N. Y., where its manufacture was entered upon with so successful a result that its cost was reduced to prices varying from \$3 to \$4.50 per pound. In 1890, by reason of two chemical discoveries, it was found that the pure metal could be extracted from common clay, and, it is claimed, can be produced for less than \$200 a ton—a price less than that of copper. As a gauge of its lightness, it may be stated that a cubic foot of silver weighs four times as much, and a cubic foot of iron three times as much as a cubic foot of aluminium, and, with its extreme ductility and its tensile strength of 25,000 to 30,000 pounds per square inch, it is destined to occupy a highly important position in the arts. See *Britannica*, Vol. I, p. 647.

**ANTIPYRINE.**—An oxygenated alkaloid. As found in commerce it is an artificial organic base, in the form of a white crystalline powder, or in scales, remarkable for its ready solubility in water. It is produced by the action of phenylhydrazine on acetic ether, and the subsequent methylation of the product. Its composition corresponds to the formula  $C_{10}H_{11}N_2O$ , and its constitution may be indicated by the designation of Dimethylphenyloxypyrazol or by Dimethylphenylpyrazol; this constitution, according to the elaborate researches of its discoverer, Dr. Ludwig Knorr, of Germany (1890), is seen in the formula grouped as follows:



Its most characteristic reactions are those it gives with perchloride of iron and nitrate of soda; the former produces a deep reddish-brown color in the neutral solution, the latter an intense emerald green tint in the slightly acidulated solution. It gives an intense red coloration with chloride of iron. It is an extremely efficacious agent for the reduction of the morbid temperature in nearly all cases of febrile disorder, such as typhus, pneumonia, pulmonary phthisis, pleurisy, acute rheumatic gout and articular rheumatism, erysipelas, peripneumonic fever, scarlatina, inflammations, etc. It effects with high fever a reduction of temperature from three and a half to five and a half degrees without unpleasant after-effects. It is given in doses of fifteen and thirty grains, and is dissolved in water or wine before each administration. The duration of the effect lasts from seven to twenty hours.

**AMIDOGEN.**—A hypothetical radical, with the formula  $NH_2$ . It is a clear and very mobile liquid, boiling at  $87^\circ\text{C}$ . The vapor, absorbing moisture and forming minute drops of the liquid hydrate, produces a white cloud in the air. Brought in contact with water, it dissolves with evolution of great heat. It attacks the skin in the most painful manner and rapidly destroys cork and caoutchouc.

**BACTERIAL FERMENTATION.**—It has been discovered that certain alkaloids which act as violent poisons are the immediate result or accompaniment of bacterial fermentation. Brieger in 1887 isolated an alkaloid, to which he gave the name *tetanine*, from the liquid used for cultivating a bacillus which has been supposed to cause tetanus traumatics in animals. It remains to be determined whether the alkaloid is a secretion or a by-product of the life of the bacillus—in which case the bacillus would be the poison cause, and the tetanine the secondary or immediate cause of disease—or whether it is a direct result of chemical action in the cultivating liquid.

**BRAN AS FOOD.**—It has been recently proclaimed (1886) by Aimé Gerard, as the result of his investigations of the alimentary value of the several tissues of which the wheat grain is composed, that while a considerable proportion of the seed coats is digestible in man, the proportion of nutriment is very small, and the quality of the bread is greatly impaired by the presence of these substances. From an economical standpoint, flour mixed with its full complement of bran is not desirable for human food, as the bran can be more profitably utilized as cattle food.

**BROMIDE OF ETHYL.**—A new anæsthetic, claimed to be far superior to ether or chloroform. It is highly indorsed by members of the medical profession for the reason that it does not influence the circulation, except sometimes to produce a slight increase in the rapidity of the heart's action, and in arterial pressure. Respiration is but little affected by it, and there is no rattling in any passage or obstruction. It vaporizes readily and produces no irritation in the respiratory passages, and there is far less tendency on the part of the

patient to struggle, as is frequently the case when ether or chloroform is administered. Complete anæsthesia is accomplished in about one-third the time experienced in the use of ether and chloroform, and the recovery is much more rapid, two minutes being enough for its completion. The drug is not inflammable, hence no danger attends its use in the presence of artificial lights.

**BROMINE**, as a chemical element, has received an immense impetus and is manufactured on a large scale from the mother-liquors obtained at Stassfurt in working the salts of potassium and magnesium. Immense quantities are also produced from similar liquors obtained in salt boiling in West Virginia, Ohio and Pennsylvania. Bromine is now being extensively used as a substitute for iodine alcoholic compounds in the manufacture of coal-tar dyes, and also to some extent in the production of various artificial dye stuffs. On account of its volatile nature, it is now generally shipped in a solid or liquid form, as bromide of iron or of ethyl.

**CHOLESTERIN**,  $C_{26}H_{44}O$ , a fatty substance, originally found in gall-stones, but now known to be present in the yolk of egg, the blood corpuscles, milk, and other animal fluids, as well as in peas, barley, rye, etc. It is soluble in alcohol and ether, and separates from its solutions in glistening nacreous scales.

**CELLULOSE.**—A substance especially abundant in Nature. It composes the cells of wood, as wax composes the cells of a honey-comb. It is the essential of the primary wall membrane of the cells, isomeric with starch in its composition, and allied to starch, sugar and inulin. Cotton and bleached flax, or *voilage*, hemp, are nearly pure cellulose. In some filter paper it has been produced almost absolutely pure. It is remarkable for its insolubility, being dissolvable only by an ammoniacal solution of copper. It has recently been brought into use in ship-building, as it is especially adapted for protection against blows, concussions, or perforations, either above or below the water-line. Its component parts are carbon, hydrogen, and oxygen, in the proportions in which they exist in the cellular tissues of all plants, woods included. The material as prepared for ship-building is usually made of the ground fiber of the cocoa-nut, with a small percentage of the original fibers. It is extremely light, and has the property of rapidly swelling when wet. A cubic foot of it, as ordinarily prepared, weighs but seven and a half to eight pounds. It is practically free from danger of fire, burning very slowly and with great difficulty when compressed. The French made experiments with it by firing a 10-inch shot through a cellulose mattress. The fibers came together so rapidly that only about three and a half gallons of water per minute passed through the aperture, and it soon closed entirely. Its use was begun in 1884, and up to 1890 it had been put into about forty vessels of the French navy, and into a number of the Russian, Dutch, Japanese, and Greek navies. In 1890 its use was ordered in the construction of the vessels of the American navy. The cost as prepared for use is about \$350 a ton, or about one dollar a cubic foot.

**COCAINE.**—A vegetable alkaloid ( $C_{17}H_{21}NO_4$ ) obtained from the leaves of the coca (or cuca, for which see *Britannica*, Vol. VI, pp. 684, 685), a small shrub growing in the mountains of Peru and Bolivia, but cultivated, after its wonderful properties became known, in other parts of South America. The principal source of the drug as a commercial product, at the present day, is the province of Yungas, in Bolivia. The leaves from which the drug is obtained are green, about two inches long, the blossoms white, and the berries red. The annual product is estimated at 40,000,000 pounds. The leaves when macerated and treated with pure wine, produce one of the finest stimulants ever tried by persons exhausted by excessive mental work, or emotional excitement. Many attempts have been made in time past by chemists to extract the medicinal and chemical properties of the plant; but no success was actually reached until 1855, when the alkaloid was isolated which proved a thorough local anæsthetic, and to which was given the name *cocaine*. The drug of commerce forms colorless transparent prisms, is odorless, and has a bitter taste. It is only sparingly soluble in water, but freely soluble in ether, and is used as a local anæsthetic. As such it has proved especially valuable in operations on the more delicate organs of the body, as the eye, etc. Two per centage of cocaine added to ordinary cacao butter-pencils converts the latter into a remedy which gives almost instant relief to a chafed or irritated skin, to insect bites, etc. In 1889 cocaine was made artificially from benzoin-cocgonine, by introducing into it the methyl group. Whether a new production possesses special therapeutic properties remains to be ascertained.

The history of cocaine is a short one, but its strength as a drug and a poison places it in the front rank of drugs as the most deadly. So benign is its influence that few who begin its use suspect its power until the "cocaine habit" is formed, and the victim is rapidly becoming a wreck. Its distinctive nature is a kind of hyperæmia of the nerve centers; but as the effect is transient, reaction sets in, and the victim is increasing power until the habit is fully formed and the victim is in the clutches of a terrible adversary with very little chance of hope for safety. As a stimulant it is justly regarded as far more powerful, rapid, and baneful in its effects than any known drug.

Beginning with 1885, when crude cocaine was first made in Peru, vast quantities were sent to the United States and to Europe. The advantages of exporting the crude alkaloid



rather than the leaves proved many and important. The principal source of supply for the United States is by the way of Hamburg.

**CORROSION OF FRUIT CANS.**—Acetic, tartaric, and citric acids dissolve more tin and more arsenic (which is quite as much) from sheets of pure metal than from alloys. This has been especially noticed in the corrosion of fruit cans and tin-foil by the acids of the fruit inclosed in them. The action is very rapid; hence a can once opened should be emptied into glass or earthenware immediately. The solder of the tin cans contains a large amount of lead, and vegetable acids act on this as well as on the pure tin of the plate, the results proving often very deleterious. In an experiment on tin cans that had been emptied, it was found that acetic acid dissolved 0.4178 grams of tin, and 0.0117 grams of lead; tartaric acid dissolved 1.0430 grams of tin, and 0.0873 grams of lead; and citric acid, 0.6838 grams of tin, and 0.1559 grams of lead. In two weeks' time the tin was completely eaten off as far as the acids reached. The use of tin-foil for wrapping the so-called Neufchâtel and other soft cheese is regarded as reprehensible by chemists, so large a proportion of what is called tin-foil containing a large admixture of lead, sometimes as much as 75 to 80 per cent. This is readily proved by the properties of lead in the cheese, and the lead is thereby received into the system.

**CHOLESTERIN.**—A substance ( $C_{26}H_{44}O$ ) crystallizing in leaflets, with a mother-of-pearl luster and a fatty feel. It occurs in the blood and brain, in the yolks of eggs, and in the seeds of buds and plants. It has also been found as a fat occurring in the feathers of birds, and is present in considerable proportions in wool. It was, until 1887, regarded as of no value when occurring in feathers and wool, except as a combustible. Liebrich has experimented with it and produced an extremely pliant, soft mass, absorbable by the skin, and capable of being readily incorporated with various medicaments. It is now being manufactured commercially, and has come into general demand as a basis for salves and cosmetics.

**CYANON.**—A white powder which has a greenish-gray tint, and which, on the application of heat of about 400° F., explodes with great violence. It is produced by passing coal-gas through an alkaline solution of bi-cyanide of mercury. In its explosion there is produced a considerable quantity of soot and carbon, while the mercury is thrown out to a considerable distance, so that cyanon may be said to combine the qualities of both gunpowder and shot.

**DECIPUIN.**—A new element discovered by Delafontaine in 1878. Its oxide (DpO) has a molecular weight of 122. The nitrate gives an absorption spectrum of three bands in the blue and indigo.

**DIAMONDS, ARTIFICIAL.**—First produced in 1880 by Prof. Hannay, of Scotland, who heated lithium in a mixture of highly rectified bone-oil and paraffine-spirit for fourteen hours, and then allowed it to cool slowly. On opening the tube in which it had been enclosed and allowing the gas to escape, he found adhering in its upper part a hard, smooth mass which had to be removed with a chisel. In pulverizing the mass transparent crystals of carbon, or diamonds, were found. Their purity was tested by burning a portion in oxygen with results indicating that their composition was 97.85 per cent. carbon. The remainder was found to be nitrogen, present in a chemical combination.

**DRYING OILS.**When linseed oil is oxidized, it undergoes very marked changes in its physical properties; the color becomes darker, the oil more viscid, and there is an increase in weight, sometimes equaling eight per cent. The drying of the oil is due to its oxidation. Some carbon and hydrogen are also driven off. These changes likewise occur during the process of "boiling." According to Cloetz (1890), the carbon and hydrogen eliminated do not all pass off as carbonic acid and water, but partly as an irritating vapor resembling acrolein.

**ECONOMICAL HEATING GAS.**—Steam passed over coke or charcoal at a red heat causes a dissociation of the elements of the watery vapor. The hydrogen being set free, and the oxygen forming compounds with the carbon, an intense heat is generated. The mechanical apparatus for producing this effect is a hollow cylindrical body of wrought-iron terminated below by a cast-iron bottom having a hole in its center, and below this a second cylinder. In this lower cylinder the fire grate is placed, the blast pipe opening into it below the fire grate. In the upper cylinder there is a coil of thick wrought-iron pipe with the ends of the coil turned outward at right angles, and passing gas-tight through the body of the generator. Various other mechanical features complete the heater. When a fire is lighted in the interior of the machine and a water-driven blower sets the coil, the steam reaches boiling point very quickly. The steam accumulating in the upper part of the coil becomes super-heated, and escaping by the small pipe with considerable force, carries with it by induction a stream of air, thus supplying the requisite oxygen for supporting combustion. The steam is decomposed in its passage over the incandescent coal, forming oxygen, carbon monoxide, and carbon dioxide. The gas produced is essentially a non-illuminating gas. It burns with a reddish-blue flame with neither smoke, soot nor deposit of any kind, the sole product being water and carbonic anhydride. In the city of London it is made in considerable quantities at about one-quarter the cost of ordinary illuminating gas. The process appears to have been first solved by Joshua Kidd, an English inventor, about the

year 1878. A popular name given to the machine is "The Water-Burning-Engine."

**EIKONOGEN.**—A new photographic developer, a description of which was first given by Prof. Lieving in 1889. It gives in gray tones the most delicate features of the subject, and also improves the tone of the product. The name is a manufactured one, for the salt consists of the sodium salt of amido- $\beta$  naphthol -  $\beta$  sulphuric acid.

**ERYTHROGEN, a compound of carbon bi-sulphuret, uniting directly with a metal without the intervention of oxygen, or any similar body. Experiments have resulted in producing a new kind of explosive (cyanol), and a new explosive (cyanon).**

**EXPLOSIONS FROM OIL LAMPS.**—Owing to the great number of accidents which have occurred since the advent of petroleum into common use, the attention of chemists has been directed to a study of the causes, resulting in many important discoveries, among which may be enumerated:—(a) If a lamp whose reservoir is only partly full be carried or moved rapidly from one place to another, a mixture of vapor and air may escape, and, becoming ignited by the flame, suddenly explode. (b) A sudden cooling of the lamp, by its exposure to a draught, or by being forcibly blown upon for its extinguishment, may give an influx of air which will crack the kerosene tank, so as to get a kerosene price for the adulterated mixture. The mixture is highly dangerous. Very many variations of the mixture of naphtha, and benzine, and petroleum, have been indulged in. Processes have been patented, and patent rights and territory have been sold to the uninitiated; secret processes for rendering gasoline, naphtha, and benzine non-explosive, have been advertised and sold; "liquid gas," "aurora oil," "petrolene," "safety gas," "puriline," "black diamond," "septoline," "anchor oil," "sunlight non-explosive burning fluid," and a dozen more truth-sounding names have been put before the public, but in every instance there has been proved by chemical analysis an element of danger without demand for the article. No roots, nor gums, nor barks, nor salts, when turned indiscriminately into the benzine will prevent its explosive power.

**EXPLOSIVE, A NEW.**—A powder discovered by Prof. Reynolds in 1878. It consists of two substances that can be kept apart without risk, and mixed as required, to form a blasting or explosive agent. The ingredients are chlorate of potassium, 75 parts; sulphurea, 25 parts. The compound is white powder, which can be ignited at a lower temperature than gunpowder, and leaves less residuum.

**FUSEL-OIL IN BRANDY, MEASUREMENT OF.**—Marquardt, in 1883, described to the scientific world a new method for the quick determination of the quantity of fusel oil in brandy. He extracted the oil with chloroform, and oxidized the product with bichromate of potash, then distilled, and treated with barium carbonate. The chloroform and the excess of barium carbonate were removed, and the baryta and barium chloride determined by means of nitric acid. The quantity of amylal alcohol or fusel-oil was calculated from the baryta.

**GLASS-MAKING, IMPROVEMENTS IN.**—So great has been the advance in procuring purer materials, that the coarser green glassware formerly in use is becoming a thing of the past, a colorless glass taking its place. The glass-pots formerly in use are being dispensed with by such improvements in the furnace, that the preparation of the glass is completed in the furnace itself, where, in three separate compartments, are accomplished the fusing, the "fining," and the bringing of it to the proper consistence for working. Plate-glass has been brought more and more into use, and very large plates have become familiar. Toughening processes are being constantly invented or discovered, rendering the material of large size, increased strength, and capable for withstanding great mechanical stress and violent blows. Optical glass is made of marvelous size and clearness; telescope lenses of 30 inches and more in diameter having been made since 1880. That of the Lick Observatory has an object glass of 36 inches.

Tieghman's sand-blast for etching on glass is an important invention, on account of its simplicity and its quickness. Its efficiency in deep cutting, its applicability to sheets and wares of any size, and the delicacy of its operation in engraving minute figures of intricate designs.

**GLUCOSE.**—A group of sugars with the chemical formula  $C_6H_{12}O_6$ . In commercial usage glucose is the name of the thick syrupy mass obtained by the fermentation of grape sugar being applied to the solid product from the same source. In chemistry, the term glucose is used to describe either substance. The glucose of commerce is thick and tenacious, of a slightly yellowish tint, although nearly colorless, and with a specific gravity at 20° C. or 68° Fahr. of 1.412. Its sweetness varies with different specimens. It is the name given to the brown, sticky, or gummy substance made from cornstarch is, when new, of a pure white color, but gradually assumes a

yellowish tint. It is hard and brittle, and dissolves more slowly in water than cane sugar. Of the two, cane sugar is the sweeter, while the grape sugar leaves a faint but perceptible bitter taste in the mouth.

Glucose occurs abundantly in sweet fruits. Chemists distinguish between two kinds, because of their action on polarized light, naming one *dextroglucose*, *dextrose*, or *grape sugar*, this form turning the plane of polarization to the right; and *levoglucose*, *levulose* or *fruit-sugar*, this latter form turning the plane of polarization to the left.

The manufacture of glucose has attained a very considerable magnitude in the United States. It is made at the factories from Indian corn by converting the starch in the grain, through the action of sulphuric acid, and is used principally for the manufacture of table-syrups, candies, also in brewing, and as food for bees, as well as in the making of artificial honey. A large percentage is also used in making cane-sugar. Bees store it away unchanged as honey. Great quantities are used in the preparation of condensed milk. The question has been raised as to the possible injurious effects caused by the use of sulphuric acid; but it has been abundantly proven that in its chemical composition, it is identical with the natural sugars of fruits and honey, which are universally accepted as wholesome.

**GRASSES, AMERICAN.**—A series of important experiments made under the direction of the Department of Agriculture, in Washington, of which a report was made in 1883, show by their analyses that American grasses are strikingly different in composition from similar German varieties, chiefly in that the content of nitrogen is smaller, and the amount of fiber diminished, while the amount of nitrogenous extract is larger, and the fat is slightly increased. The deduction is conclusive that the nutritive range of American grasses is much wider than in the German grasses. The American wild grasses are less nutritive than the cultivated sorts.

**HYALINE.**—A newly manufactured composition, described as horny, translucent, possessing great tensile strength, and having considerable elasticity. It is used as a substitute for celluloid, and can be worked, dyed, pressed, denitrated, and rendered incombustible, or fireproof. It is composed of about equal parts of gun-cotton and colophony, or shellac, copal, dammar, turpentine, or of any mixture of any of these resins.

**HYDRAZINE.**—A colorless stable gas with a formula of  $H_2N_2$ . It is soluble in water, has a peculiar odor, and a strongly alkaline reaction. It attacks glass energetically, and rapidly destroys cork, and caoutchouc. Its taste, somewhat like that of ammonia, leaves a burning sensation on the tongue. It is an extremely strong reducing agent, and is, therefore, one of the most important factors yet discovered in chemical operations.

**KEPHIR.**—A fermented milk described by M. Strove, of Tiflis. What *koumiss* is to the inhabitants of southeastern Russia, *kephir* is to those of the northern Caucasus. In its preparation cow's, sheep's or goat's milk is fermented in leather bottles with *kephir-grains*. These grains are the ferment proper, the leathern bottle not being deemed a necessity. During the fermentation the milk becomes very much changed. At a given stage the ferment-substance, or *kephir-grains* are removed, and dried in the sun, when they are ready for another service. An analysis of the dried grains gave:

|                                  |       |
|----------------------------------|-------|
| Water.....                       | 11.21 |
| Fats.....                        | 3.98  |
| Soluble pectonic substances..... | 10.98 |
| Proteids soluble in ammonia..... | 10.32 |
| Proteids soluble in potash.....  | 33.89 |
| Insoluble.....                   | 35.11 |

The insoluble residue exhibited under the microscope an intimate mixture of yeast-cells, and seemed to be the only active part of the *kephir-grains*. From this it is concluded that the fermentation of the milk is entirely due to *Saccharomyces Mycoderma*. The addition of a small quantity of "finished" drinkable *kephir* will start fermentation in fresh milk in the same manner as the *kephir-grains*.

**IMPERIALINE.**—An alkaloid obtained from the bulb of the poisonous plant Crown Imperial (*Fritillaria imperialis*). It is when first obtained, in the form of a yellow precipitate, but from the alcoholic solution crystallizes in short colorless needles with a composition of  $C_{25}H_{20}NO_4$ . The crystals are not readily soluble in water, but yield to ether, chloroform, and alcohol. A chloride has been obtained which makes bitter solution with alcohol and water, and forms salts with platinum and gold. The discoverer was Dr. Fragner, of Prague.

**IRON SURFACE, PROTECTION OF.**—A process for protecting from rust, invented in 1879 by M. Dodé. It consists in coating either by bath or brush, the surface of cast or wrought-iron, with a solution of borate of lead, oxide of copper, and spirits of turpentine. When dried, the metal is passed through a furnace, heated from 500° to 700° F., according to the thickness of the articles under treatment, so as to bring them to a cherry-red heat. At this point a fusion of the metallic pigment takes place, and, entering the pores of the iron, gives a dark coating, which will not scale off, and repels the action of the atmosphere, gases, alkaline, and other vapors. The cost of the process, which is intended to take the place of painting and varnishing, is about one-half a cent per square foot. Another process, invented by Bown in

the same year, employs magnetic oxide, which is applied while the articles are hot. It is claimed that this process effectually protects iron from oxidation in any form.

**DIRECT PRODUCTION OF.**—Prof. Hertz has demonstrated (1891): (a) That the medium which intervenes in the phenomena of electrical action is the same as that which is the seat of luminous phenomena; (b) that both species of perturbations are propagated under the same conditions, and with equal velocity; and (c) that there is identity of nature between certain electrical and luminous phenomena. Experiment has given the following results for the ratio of duty of different luminous sources which can be measured in this way as light, the total radiation being taken as unity:

|                                 |         |
|---------------------------------|---------|
| Candle.....                     | 0.00298 |
| Petroleum lamp.....             | 0.00315 |
| Gas light.....                  | 0.00317 |
| Oil lamp.....                   | 0.00442 |
| Incandescent electric lamp..... | 0.06    |
| Arc lamp.....                   | 0.1     |

Thus the electric arc lamp which gives the highest duty of light wastes nine-tenths of its energy in non-luminous, invisible heat rays. Experiment for quickening these rays are being energetically prosecuted.

**LUMINOUSITY OF FLAME.**—From careful experiments conducted by Heuman, that eminent scientist advanced the theory in 1878 that the luminosity of hydrocarbon flames is due to the presence of solid particles of incandescent carbon. The grounds on which his opinion is based are briefly stated as:

(a) The increased luminosity which carbon gives to weakly luminous or non-luminous flames is due to its well-known property of separating the carbon as such. (b) A rod held in a flame is smoked only on the lower side, the side opposed to the gas-stream. (c) A body held in a flame is smoked even when it is in a state of ignition. (d) These particles can be actively withdrawn from the flame when it is made to strike against a second flame or an ignited glass plate, the particles aggregating together to form visible masses. (e) The luminous portion of a flame is not very transparent—no more so than the layer of smoke of the same thickness which rises above a flame fed with turpentine. (f) Flames which unquestionably owe their luminosity to the presence of solid particles give a shadow with sunlight, precisely as do hydrocarbon flames; while luminous flames composed of ignited gases and vapors give no such shadow in sunlight.

**LUMINOUS GLASS.**—A phosphorescent powder is mingled with the glass while in a fused state, in the proportion of five to twenty per cent. of mass of glass. After the composition has been duly puddled, or mixed, it is converted into different articles by the ordinary processes. While the material is still warm and plastic, it is sprinkled with the powder, which becomes readily incorporated into the surface of the article by pressure, and the constant effect of luminosity or iridescence is readily produced.

**MANGANESE MINERAL, A NEW.**—A hydrous sulphate of the manganese group discovered by Mr. Iles in Colorado in 1882. It is composed of loosely adhering, very friable, thick orthorhombic prisms, which frequently terminate in truncated pyramid, with a slightly glimmering luster. The aqueous solution effervesces with sodium carbonate, and reddens blue litmus paper. Its hardness is from .75 to 1, and its specific gravity is 2.167.

**MILK.**—A new explosive invented by Redtenbacher, of Austria, in 1886. It is a brownish-black powder, incombustible to percussion and friction, and ignitable only by a spark as from 335° to 340° C. It is claimed that it contains the elements of ordinary powder, and can be employed as powder is, but made to produce effects comparable with those of dynamite.

**MILK OF THE EGYPTIAN BUFFALO.**—From experiments made by MM. Reppel and Richmond, of the Khedive Laboratory, Cairo, in 1891, the milk of the Egyptian buffalo (*Bos bubalus*) presents several characteristics distinguishing it from that of the cow. In Egypt the milk is extensively used by physicians for invalids, especially infants. The amount of fat is much greater than in cow's milk, the percentage varying from 5.1 to 7.35. The sugar, which appeared to be a hitherto undescribed variety, differing from milk sugar, was found to be of larger amount than that in cow's milk, the average percentage being 5.41. It was suggested that it be called *lactulose*. The fat was found to differ from that of cow's milk, in containing minute quantities of sulphur and phosphorus, and yielding four times as much caproic acid as butyric acid. The fat in cow's milk the quantity of caproic acid is only double that of butyric acid. The milk also contained citric acid.

**NITRIFICATION.**—Among the older chemists it was believed that a decaying organic body evolves more or less of its nitrogen in a free state, and that this while nascent combines with the oxygen of the air. This, however, is no longer regarded as a purely chemical process, but the work of a living organism comparable to the yeast plant. Among many modern chemists the agent is believed to be ozone. Yet it has been discovered that the temperature of boiling water suffices to destroy all power of nitrification. As a fact the process of nitrification is strictly limited to the range of temperature within which the vitality of the living ferment is confined.

**OLIVE OIL.**—NEW TEST OF ACCURACY.—According to Prof. Richi of Florence, cotton-seed oil can certainly be detected in olive



oil by the test of a one per cent. solution of nitrate of silver in absolute alcohol. The test was applied to a sample of pure olive oil, and a sample in equal quantity of the doubtful oil. The pure oil was not affected, but the mixed oil began to darken to a tint depending on the amount of the adulterant present.

**OLEOMARGARINE.**—The first manufacture of oleomargarine in the United States was by Paraf in 1873, and for a year or two the sales were light, the product not being as good as that made under Mège's method in Paris. Experiments toward improvement were begun by Dr. Mott, of New York, with excellent results. These were followed by others, especially by Mr. G. Harding, most of which were satisfactory. A new industry was thereby created, and factories for its production were built in several States, some of them with a capacity for producing 50,000 pounds of the material daily. In order to make this quantity 122,000 pounds of fat were required. A careful analysis shows from what it appears its constituents are:

|                    |        |
|--------------------|--------|
| Water.....         | 11.206 |
| Butter solids..... | 88.793 |
|                    | 100.   |

While the constituents of cream butter are:

|                    |        |
|--------------------|--------|
| Water.....         | 11.943 |
| Butter solids..... | 88.052 |
|                    | 100.   |

Oleomargarine has, under the microscope, identically the same appearance as butter made from cream, but has less of the volatile fats in it, and keeps sweet for a much longer period than dairy butter. In 1882 very strict laws were enacted by the State of New York in reference to the manufacture and sale of the article; and the example set by her was generally followed by other States. One important requirement of the law is that every package of oleomargarine sold shall be invariably marked "Oleomargarine," and a penalty is provided for its breach. In 1884 the manufacture was carried on on an enormous scale. Three factories in the State of New York alone turned out not less than 4,500 tons. Grave fears have from time to time been expressed that animal parasites, or diseases might be introduced into the human system by this substitute for butter, but analysis has failed to discover them; and, as the aim of the manufacturers is to produce a sweet and merchantable article, it would be against their interests to use poor materials. It may be said in truth that the discovery and invention of Mège, with the improvements which have since been made, have revolutionized the treatment of beef-fat, which was formerly converted into tallow. Large quantities of the manufactured product are annually shipped to England and other European countries, where it is put on the market as *butterine*, or *suine*. In some factories lard, as well as cotton-seed oil, is used as a substitute for oleomargarine in making artificial butter. Oleomargarine and lard are also used in making cheese from skimmed milk.

**OXALOMOLYBDIC ACID.**—A solid, crystallizing in large monoclinic prisms. It is nearly insoluble in strong nitric acid, but the crystals dissolve in water, yielding a colorless and strongly acid liquid. The crystals when dry are affected neither by sunshine nor dark. When moist and exposed to the sun's rays, they quickly become blue. If a piece of paper be immersed in the solution dried in the dark and exposed behind a photographic negative, a sharp print in blue is readily obtained by exposure to the sunlight, but the color will instantly disappear in contact with water. If, however, the paper with its blue markings be exposed to a gentle heat for a few minutes, the blue changes to black, and the characters are no longer destroyed by water.

**OXYGEN, SOLIDIFICATION OF.**—This was announced in 1886 as having been accomplished by Prof. Dewar. He allowed oxygen to expand in a partial vacuum, when an absorption of heat took place. The confined oxygen became like snow, and had a temperature of 209° C. (360° F.) below the freezing point of water.

**OZONE, LIQUEFACTION OF.**—This was accomplished by MM. Hautefeuille and Chappuis in 1880. In performing their experiment they ozonized oxygen to a greater extent than had ever before been done, by passing a silent electric discharge through it at a low temperature. The oxygen was then conducted into the capillary tube of a Cailletet's apparatus at a temperature of -23°. After a few strokes of the pump the gas in the tube became of an azure blue. The pressure was increased until under 95 atmospheres it became of a dark indigo blue. The pressure was suddenly removed, when the mist which indicates liquefaction was formed in the tube, the gas appears to be chiefly dependent on the temperature. Ozone is much more easily liquefied than oxygen, the latter requiring the pressure of 300 atmospheres at a temperature of -29°.

**PAPPAINE.**—A new digestive agent, derived from the juice of the common papaw tree (*Carica papaya*). The milky juice is slightly bitter and styptic, and free from tartness. It flows from incisions made in the bark and the green fruits, and is bottled and sent to market, either pure or with the addition of ten to twelve per cent. of alcohol to prevent fermentation. The most important property of papaine, and one which puts it in the rank of the most powerful digestive ferments, is its action on meats. One part will digest and transform into

soluble peptone from 250 to 300 parts of meat. Its solubility in different fluids allows it to be used in a great many pharmaceutical forms, and being a vegetable juice it can be preserved more readily than animal ferments. When dry it can be kept indefinitely. Attention was first called to its peculiar properties by M. Wurtz before the French Academy of Sciences in 1881.

**PAPER MANUFACTURE.**—Owing to the immense demand for paper, and the inability to secure a supply from rags, esparto, etc., much attention has of late years been given to its production from wood, the supply of which is practically inexhaustible. Various processes have been patented in the United States and Canada. Their result can be best summed up as follows: Wood or straw is cut in pieces, macerated with milk of lime, transferred to a digester after twenty-four hours, and saturated with sulphurous acid, with the simultaneous application of a pressure of five atmospheres, for one or two hours. Washings with water and further pressure is given, with treatment of three per cent. calcium chloride and one-half per cent. aluminum sulphate. The pulp begins to resemble cotton in appearance, and is employed for manufacturing the finer grades of paper at once. Pine, birch, beech, and hickory are stated as producing the finest "linen" paper stock. Pulp mills are abundant in many of the Northern and Western States, whence the pulp is shipped to other mills for final disposition.

**PHILLIPIUM.**—An oxide discovered by M. Delafontaine, and described by him in 1878. The earth of the metal phillipia is yellow, like terbia, but its equivalent is lower. Phillipium crystallizes with great facility either by cooling or by spontaneous evaporation, in small, brilliant, rhomboidal prisms. In the spectroscopy the concentrated solution of phillipium gives in the indigo blue a magnificent absorption band, very intense and rather broad, with well-defined edges.

**PHOTOGRAPHY, COLORED.** has received a great deal of attention—but see under PHOTOGRAPHY, IMPROVEMENTS IN.

**PONSSELLOS.**—A carlet powder of very brilliant tint. It rivals gold itself in resisting the effects of atmospheric influences, and like gold is only attacked by *aqua regia* and those fluids which generate chlorine. Nor does sulphureted hydrogen have any effect upon it, or any of the hydrosulphates, so that as a paint it is practically imperishable. It was first described in 1878. Its composition as given seems to consist of:

|               |             |
|---------------|-------------|
| Mercury.....  | 1 atom=202  |
| Sulphur.....  | 3 atoms= 48 |
| Carbon.....   | 1 atom= 6   |
| Hydrogen..... | 1 atom= 1   |

Thus making its atomic equivalent equal.....277

**PURIFYING WATER.**—A method of purifying water was adopted in 1880 at the Royal Aquarium in London with most satisfactory results. The method of procedure is as follows: Receive the water in a "softening cistern," and expose it to a jet of lime-water. This coagulates the clay that is held in suspension, and causes the impurities to be deposited at the bottom. The water is afterward passed into a filter with a large surface, so arranged that it can be cleaned by mechanism in a few minutes. The cleansing usually takes place once a day. The filtering capacity is from 80 to 100 gallons of water an hour for each square foot of filter surface. The health of the occupants of the tanks was greatly improved as a result. The system immediately became popular, and was put into extensive use.

**PYRIDINE.**—A colorless liquid, derived from coal tar. Its symbol is  $C_5H_5N$ . It has a pungent odor, and its special use is in alloying alismatic paroxysms, in accomplishing which it has proved extremely valuable.

**RARE EARTHS.**—Investigations of the spectra of various rare earths have led scientists to declare that there are elements whose existence is only revealed by the spectrum lines, and which still remain to be separated. Most valuable researches have been made by European physicists, and most interesting results are being constantly announced.

**RUBERINE.**—A new coloring matter extracted from the *Agaricus ruber*, a poisonous fungus, and first described by Dr. Phipson in 1882. It possesses interesting optical and chemical qualities. In color it is a beautiful rose-red, and when seen by transmitted light presents a very vivid blue fluorescence. In its spectrum it gives two wide and dark absorption bands in the green. It is soluble in water and alcohol, in solutions that are rose-red by transmission, and blue by reflection.

**SAMARIUM.**—A new metal found in samarskite, the molecular weight of whose oxide is less than 17, and was first discovered by M. Delafontaine in 1878, but not verified until by M. Lecoq in 1881. It is regarded as identical with the  $\beta\beta$  described by Marignac.

**SCANDIUM.**—A metal discovered in 1879 by Nilson in erbia, which up to that time had been considered as the oxide of a single metal, erbium. It occurs only in minute quantities, and forms but a minute, scandia ( $Sc_2O_3$ ). It is a perfectly white, light, infusible powder. The strongest acids attack it with difficulty. Its specific gravity is 3.8, and its atomic weight 45.12.

**SPECTROSCOPE, A NEW.**—Recently devised (1888) by Krüss, based on the Bunsen and Kirchhoff instrument. So great is its power that spectrum measurements may now be made between two colors whose wave-lengths differ only 0.000,000,000.015mm.

**SULPHUREA**.—A body discovered by Prof. Reynolds, and obtained principally from the waste products of gas manufacture. It is a compound, and with three times its weight of chloride of potassium, it forms an explosive more powerful and much cleaner than gunpowder.

**TEMPERATURE OF FLAMES**.—By some very skillful experiments made by Rosetti in 1878 with his ingenious calorimeter, investigating the temperature of different flames, he is enabled to present to the scientific world the result of his investigations in the following table:

|                                     |                    |
|-------------------------------------|--------------------|
| Locatelli lamp.....                 | 920° C.            |
| Stearine candle.....                | 940° C.            |
| Petroleum lamp, with chimney.....   | 1,030° C.          |
| Petroleum lamp without chimney..... |                    |
| Illuminating part.....              | 920° C.            |
| Sooty envelope.....                 | 780° C.            |
| Alcohol lamp.....                   | 1,170 to 1,180° C. |
| Bunsen burner.....                  | 1,560° C.          |

**THEOPHYLLINE**.—A new base discovered in tea. It forms a well crystallized series of salts with the mineral acids, and with platinum, gold and mercury chlorides. It also yields with silver nitrate a silver substitution compound, which is readily soluble in nitric acid.

**TYROTOXICON**.—A poisonous substance found by Prof. Vaughn in certain kinds of cheese. From an alcoholic extract a residue was collected, which, like the aqueous extract, produced the symptoms of poisoning. The poison was separated by spontaneous evaporation in needle-shaped crystals, having a penetrating, old-cheese odor, like that sometimes observed in poisonous sausages. When the crystals were allowed to stand exposed to the air at ordinary temperature, they decomposed with the formation of an organic acid. Tyrotoxinon is soluble in water, alcohol, chloroform and ether. A few drops of an aqueous solution of the crystals placed upon the tongue produced the symptoms characteristic of poisonous cheese: dryness of the throat, nausea, vomiting and diarrhea. The specimens of cheese secured for analysis gave, when freshly cut, various drops of a slightly opalescent fluid, which reddened litmus instantly and intensely.

**WOOL, SILK AND COTTON, DETERMINING THEIR RESPECTIVE AMOUNTS IN TISSUES**.—Four portions of cloth are taken, of equal weight. One is put aside, and the other three boiled in hydrochloric acid for the removal of the dyes and weighting materials. One of these boiled pieces is laid aside, and the other two exposed in a boiling solution of basic zinc chloride for the removal of the silk. One of these latter is laid aside, and the other boiled in soda-lye. All four are then heated in distilled water, and after 24 hours weighed. The difference between the first and second represents the dressing; that between the second and third gives the silk; that between the third and fourth, the vegetable fiber present; the remainder is wool.

**YTERBIUM**.—A new element described by Marignac in 1878 as found in gadolite. The atomic weight of 131 was provisionally adopted, but in 1880 it was changed and declared to be 173.01.

New processes are being constantly developed; new minerals discovered; new compounds produced. The instances given in the foregoing list are but specimens of the immense progress made in the past decade. Chemical science is constantly developing, and in every direction. The immensity of the field makes it practically limitless, and the fascinations of the study are calling into rank the best mental power and learning in all the civilized countries. For additional information, see the topics severally as given in these volumes.

**CHEMITYPE**, the name given to the art of producing on a metal plate by a chemical process and engraving in relief.

**CHEMNITZIA**, a genus of gasteropodous mollusca. There are many recent species scattered all over the world. No less than 180 have been described, occurring throughout all the divisions of the fossiliferous strata from the Lower Silurian upwards.

**CHEMULPO**, a town on the west coast of Corea, 25 miles by road southwest of the capital, Seoul. It is one of the three treaty ports opened in 1883 to foreign commerce, the volume of which has since steadily advanced in spite of the drawbacks resulting from the great difference between high and low water here (33 feet), and the want of wharves. Since 1885 it has been connected by telegraph with Tientsin.

**CHEMUNG PERIOD**, the name given by American geologists to one of the principal divisions of Devonian time.

**CHENAB**, one of the five rivers which give name to the Punjab. It rises in the Kashmir range of the Himalayas, winds through the gorges of Jammu, and enters British territory in the Sialkot district. Its length is 755 miles.

**CHENANGO RIVER**, a river which rises in Oneida county, N. Y., flows southwest and enters the Susquehanna at Binghamton. It is 90 miles in length.

**CHENEY**, THESEUS APOLEON, historian, born in Leon, Cattaraugus county, N. Y., March 16, 1830, died in Starkey, N. Y., Aug. 2, 1878. He was educated at Oberlin, and spent most of his life in studying and writing the history of Southern New York. To him belongs the honor of having suggested, in a speech at Conewango, N. Y., Aug. 20, 1854, the name "Republican" for the party then being formed.

**CHENILLE** (French, "caterpillar"), a thick velvety cord of silk or wool, used in ornamental sewing and manufactured trimmings. Also a popular name for *Dasya elegans*, a beautiful species of marine algae, having long cylindrical fronds, closely fringed with fine red filaments.

**CHENONCEAUX**, a famous French château, standing partly on an island in the Cher, partly on a bridge spanning the river, near a station 20 miles southeast of Tours. It was commenced in 1524 by Chancellor Thomas Bohier, continued by Diana of Poitiers, and completed by Catherine de' Medici, who richly embellished the building, and surrounded it with a beautiful park. It passed to the Condés, and afterwards to Madame Dupin, who was here visited by Montesquieu, Bolingbroke, Voltaire, Rousseau, Buffon and others. The castle is in excellent preservation, and possesses a fine chapel, a theater, and memorials of its former occupants in furniture, personal relics, and a collection of portraits.

**CHENOPODIACEÆ, or SALSOLACEÆ**, a natural order of exogenous plants, mostly herbaceous or half shrubby. There are about five hundred species, of which the beet and spinach are among the best known and most useful. Some of the species contain large quantities of alkaline salts. Some possess aromatic and medicinal qualities.

**CHENOPODIUM**, a genus of plants of the natural order *Chenopodiaceæ*. It includes various common weeds, such as goosefoot, pigweed, etc., which are eaten as greens when young. It is widely distributed in temperate regions. *C. anthelminticum*, the wormseed of the United States, has a strong and somewhat aromatic odor, and a reputation as a vermifuge.

**CHER**, a French river, flowing 200 miles northward and north-westward till it falls into the Loire below Tours. It is navigable from Vierzon.

**CHERAW**, a railroad junction in Chesterfield county, S. C., at the head of navigation on the Pedee River. This place was made a depot of supplies by the Confederates during the late war, but was captured by General Sherman's troops, March 3, 1865.

**CHERBOULIEZ**, VICTOR, an eminent French novelist, born at Geneva in 1829. Besides numerous popular works of fiction, he has published many volumes on literary and art criticism, and on politics.

**CHERIMOYER**, or **CHIRIMOYA**, a deliciously flavored fruit of Brazil and Peru. It belongs to the same genus as the *custard-apple*. Externally it is greenish, covered with small knobs and scales, the skin rather thick and tough. Internally it is white and juicy. The eatable part it soft like a custard, and forms almost the entire mass of fruit.

**CHEROKEE**, the county-seat of Cherokee county, Iowa, situated on a railroad and the Little Sioux River.



**CHEROKEE INDIANS.** See Vol. V, pp. 585-86. See also **INDIANS, AMERICAN**, in these Revisions and Additions.

**CHERRY.** See *Britannica*, Vol. V, p. 586.

**CHERRY VALLEY**, a village on a railroad in Otsego county, N. Y. On Oct. 11, 1778, nearly all the inhabitants were massacred by Indians and Tories, and the buildings were all burned.

**CHERT**, or **HORNSTONE**, a variety of quartz, always massive, and having a kind of granular appearance and structure. It is common in mountain limestone, oolite, and green-sand formations; sometimes forms rocks, and often contains petrifications. It passes into common quartz and chalcedony, also into flint and flinty slate. See *Britannica*, Vol. X, p. 239; Vol. XVI, p. 389.

**CHERVIL** (*ANTHRISCUS CEREFOLIUM*), a plant of the natural order *Umbelliferae*, cultivated as a potherb, and used in the same manner as parsley. It is a native of Europe.

**CHESAPEAKE BAY**, in Maryland and Virginia, and dividing the former State into two parts. It is the largest inlet on the Atlantic coast of the United States, being 200 miles long, and from 4 to 40 broad. Its entrance, 12 miles wide, has on the north Cape Charles and on the south Cape Henry, both promontories being in Virginia. The bay has numerous arms, which receive many navigable rivers, such as the Susquehanna on the north, the Potomac, Rappahannock and York on the west, and the James on the southwest. This network of gulfs and estuaries, with its noble feeders, affords depth of water for ships of any burden.

**CHESELDEN, WILLIAM**, an English surgeon and anatomist, born at Somerby, near Melton-Mobray, in 1688, died at Bath, April 10, 1752. Having in 1711 established himself in London as a lecturer on anatomy, he was next year elected a Fellow of the Royal Society. He was afterwards appointed surgeon to St. Thomas's, St. George's, and Westminster hospitals, where he acquired great reputation in 1727, especially by his "lateral operation for the stone." In 1728 he operated on a young man born blind, and the successful result of the operation did much to develop the theory of vision.

**CHESNEY, FRANCIS RAWDON**, the explorer of the Euphrates, born at Annalong, in County Down, Ireland, in 1789, died Jan. 30, 1872. He was gazetted to the Royal Artillery in 1805. In 1829 he inspected the route for a Suez canal, which he proved to be practicable.

**CHESS**, or **CHEAT**, the *Bromus secalinus*, a troublesome graminaceous weed, which infests wheat-fields. There is an erroneous vulgar notion that wheat itself is often transmuted into chess.

**CHEST**, or **THORAX**, in anatomy, the part of the body which lies beneath the neck and above the abdomen, constituting the uppermost of the two divisions of the trunk, or that which contains the heart and lungs. The chest is somewhat conical in form. Its sides are rounded, but in front and behind they are flattened. The apex or upper end is truncated, sloping downwards and forwards. Of small size, it permits of the passage of the gullet, windpipe, certain large veins and nerves from the neck into the chest, and of certain large arteries out of the chest. The broad or lower end of the cone slopes downwards, and is shut in by the diaphragm—a large muscular partition, which projects upwards from the lower ribs, being convex towards the chest and concave towards the abdomen. In respiration the diaphragm descends by its own muscular contraction, while at the same time the ribs are drawn upwards and outwards by the intercostal muscles. The structures forming the walls of the chest are: (1) The backbone or spinal column; (2)

twelve pairs of ribs; (3) the sternum or breastbone; (4) the diaphragm; and (5) the intercostal muscles. The contents of the chest are the heart, the great arteries and veins, the lungs, the trachea, or windpipe, the bronchi, or branches of the trachea leading to the lungs, the oesophagus or gullet, and the thoracic duct, or general terminus of the lymphatic system of vessels, by which the chyle and lymph are discharged into the blood.

**CHEST, MILITARY**, a technical name for the money and negotiable securities carried with an army, and intended to defray the current expenses.

**CHESTER**, a coal-shipping city and county-seat of Randolph county, Ill., situated on the Mississippi River. It has a grain elevator, and flour and rolling mills.

**CHESTER**, a city of Pennsylvania, on the Delaware River, about 15 miles below Philadelphia (see *Britannica*, Vol. V, p. 606). The town was settled by the Swedes in 1643, and called Upland. It was incorporated in 1866. Ship-building is its chief industry, several thousand men being employed in the ship-yards. Population in 1880, 14,997; in 1890, 20,167.

**CHESTER**, a manufacturing town of Windsor county, Vt., on a railroad. It has an academy, and produces leather, furniture, lumber, boots and shoes.

**CHESTER, JOSEPH LEMUEL**, antiquarian, born in Norwich, Conn., April 30, 1821, died in London, England, May 28, 1882. He was a writer for the Philadelphia press, and in 1858 went to England and made researches in the genealogies of the early settlers of New England. Mr. Chester published, with notes, an abstract of the Westminster Abbey registers, and collected much valuable family history.

**CHESTERFIELD INLET**, a narrow gulf penetrating to the westward from the northwest of Hudson Bay, its extreme dimensions being 250 and 25 miles.

**CHESTERTOWN**, a railroad and seaport town, county-seat of Kent county, Md. It is on the west bank of the Chester River. Washington College is here.

**CHESTNUT.** See *Britannica*, Vol. V, p. 608.

**CHESTOPA**, a railroad center of Labette county, Kan., near the line of Indian Territory, situated on the Neosho River. The city has many mills, where flour and castor-oil are made. There are also schools, stock-yards, and also a foundry.

**CHEVALIER**, an honorary title given formerly to younger sons of French noble families. Brought up in comparative luxury and having very little money, they became frequently aristocratic parasites. The title was given by their partisans to the old and also to the young pretender.

**CHEVALIER, MICHEL**, a French political economist, born in Limoges, Jan. 13, 1806, died Nov. 28, 1879. In 1828 he edited the "Globe," and four years later was sent by Thiers to examine the canals and railroads of the United States. He was an advocate of free trade, a professor of political economy in the College of France, in 1841 chief engineer of mines, and in 1860 became a Senator. He wrote several books about America.

**CHEVERUS, JEAN LOUIS ANNE MAGDELEINE LEFEBVRE DE**, Roman Catholic prelate and philanthropist, born in Mayenne, France, Jan. 28, 1768, died in Bordeaux, July 19, 1836. He went to Boston in 1796, having suffered persecution in France, became famed for eloquence and also for his philanthropy during a yellow fever epidemic. In 1803 he founded the Church of the Holy Cross; in 1810 became the first bishop of Boston, and founded the Ursuline convent at Charlestown. Returning to France on account of ill health he was conse-

crated archbishop of Bordeaux in 1826, and cardinal nine years later.

CHEVES, LANGDON, statesman, born at Rocky River, S. C., Sept. 17, 1776, died in Columbia, S. C., June 25, 1857. He was a lawyer, and became eminent in his profession; served in Congress from 1811 to 1816; was Speaker of the House during one session, and in 1816 became judge of the superior court of South Carolina. While in Congress he voted against rechartering the United States Bank, but in 1819 he was elected its president, holding this position for three years. In 1822 Mr. Cheves became commissioner of claims under the Ghent treaty.

CHEVEREUL, MICHEL EUGENE, a French chemist, born at Angers, Aug. 31, 1786, died in 1889. He lectured at the College Charlemagne, and was appointed special professor of chemistry in charge of the dyeing department at the Gobelins. In 1826 he took his seat in the Academy of Sciences, and in 1830 became director of the Museum of Natural History. One of his earliest discoveries was that of margarine, oleine, and stearine in oils and fats. His studies in fatty bodies and his theory of saponification have opened up vast industries. Between the years 1823 and 1864 Chevreul studied colors, publishing important memoirs from time to time.

CHEVRON, in heraldry, one of the honorable ordinaries, representing the couples or rafters of a house, and supposed to betoken the accomplishment of some memorable work, or the completion of some business of importance.

CHEVRON, in architecture, a molding in the form of a succession of chevrons, otherwise called zigzag molding. In general it is characteristic of Norman architecture.

CHEVRONS are bands or stripes of braid, meeting at an angle on the coat sleeves of non-commissioned officers. The number of stripes indicating the rank of the bearer.

CHEYENNE, a city and the capital of the State of Wyoming, and county-seat of Laramie county, located in the southeastern part of the State, on Crow Creek, and on the eastern slope of Laramie Mountain, at an altitude of 6,041 feet above sea level. It was founded in 1867, and because of its rapid growth has been called the "Magic City of the Plains." It is an important railroad center, being on the Union Pacific, the Denver Pacific, the Cheyenne and Burlington, and the Cheyenne and Northern Railroads. The railroad shops of the Union Pacific Railroad, which are located here, are built of brick and stone, and cost between \$4,000,000 and \$5,000,000. The State capitol, which covers nearly three acres of ground, is built of native sandstone, and cost \$300,000. Public, private, and denominational schools and a public library provide ample educational facilities. Cheyenne owed its first settlement to the discovery of gold in the Black Hills, but its present prosperity is largely due to the growth and profits of the cattle trade. Population in 1880, 3,456; in 1890, 11,693.

CHEYENNE INDIANS, a warlike branch of the Algonquin stock, originally on the Red River of the North, later on the Cheyenne River in Wy-

oming, and as far south as the Arkansas. They are now partially settled in Indian Territory.

CHEYNE, GEORGE, an eminent Scottish physician, born in Aberdeenshire in 1671, died at Bath in 1743. In 1700, after taking the degree of M. D., he repaired to London, where he practiced in winter, and in Bath in summer. In 1702 he published *A New Theory of Fevers*, and a work *On Fluxions*, which procured him admission into the Royal Society. Among his other works are: *Philosophical Principles of Natural Religion*; *Essay on Health and Long Life*, etc.

CHEYNE, THOMAS KELLY, English clergyman and Biblical critic, born in London, Sept. 18, 1841, and educated at Merchant Taylors' school and Worcester College, Oxford. He was rector of Tendring in Essex from 1881 to 1885, when he was appointed Oriel professor of the Interpretation of Holy Scripture at Oxford and Canon of Rochester. He was a member of the Old Testament Revision Company, and has contributed many articles on Biblical questions to the magazines and reviews. A critic of ripe scholarship and remarkable clearness in exposition, he has done much to advance Biblical science. His chief books are: *The Prophecies of Isaiah* (1880; 3d ed., 1885); *Exposition of Jeremiah and Lamentations* (1883); and *The Book of Psalms, or Praises of Israel* (1888).

CHIABRERA, GABRIELLO, an Italian poet, born at Savona, June 8, 1552, died Oct. 14, 1637. An enthusiastic student of Greek, he conceived a great admiration of Pindar, and strove not unsuccessfully to imitate him. He wrote several epics, bucolics, and dramatic poems.

CHIANA (in ancient times, *Clanis*), a river in Tuscany, formed by several streams from the Apennines, and falling into the Arno a few miles below Arezzo. Along with another river of the same name it waters the level Val di Chiana.

CHIANTI, an Italian mountain-range in the province of Siena, clothed with olive and mulberry trees and vines. The mountain gives name to an excellent red wine grown here.

CHIAPA, or CHIAPAS, a State in the southeast of Mexico, lying to the southwest of Yucatan. The highlands have an agreeable climate, but the lowlands are hot and sickly.

CHIAROS CURO, a kind of painting in which the effects of light and shade are produced without colors—for example, painting in black and white or by different shades of a single color, such as brown.

CHICA, a red substance, valuable as a dye-stuff, obtained by boiling the leaves of a species of *Bigonia*, a native of the banks of the Cassiquiare and the Orinoco. It is used in the United States to produce red and orange shades on cotton and wool.

CHICA, or MAIZE BEER, a fermented liquor made from maize or Indian corn. It is much used in some parts of South America.

CHICACOLE, a town of the district of Ganjam, in the Madras province, on the Languliya River, 567 miles northeast of Madras by the Grand Trunk Road. It has a reputation for muslins. Population, 16,355.



## CHICAGO

CHICAGO, the capital of Cook county, Illinois, the second city of the Union in population and commercial importance, and the sixth city of the world in number of inhabitants, is situated on the west shore of Lake Michigan, at the mouth of the Chicago river. Its position, 911 miles in a direct line from New York, and 2,450 miles from the Pacific coast, at the head of lake navigation and the central point of 90,000 miles of railroad, marks it as pre-eminently the commercial center of the United States. Its history is little less than a miracle. But two generations ago it had practically no existence, although as early as 1779 a log cabin on the bank of the river, tenanted by a negro trapper, marked the site of the future metropolis. In 1803 a military post was founded and called Fort Dearborn, after the distinguished soldier of that name. In the War of 1812, this post was evacuated by the United States troops, who, with a number of settlers, were massacred at a point within the present city limits. The fort was destroyed, but was rebuilt in 1818, and around this the usual features of a cross-roads village—a tavern, a store or two, a school-house and some log-cabins, tenanted by hunters and fur-traders, sprang up.

The position of Chicago, at the head of navigation on Lake Michigan, attracted the attention of intending settlers, and under the law of 1829 a town site was laid out by the canal commissioners. This included three-eighths of a square mile. Three years later the town was organized by the election of a board of trustees. It then covered 560 acres, had 550 inhabitants and 195 buildings. The area of Chicago in 1892 is over 180 square miles. It extends from the southern boundary of Evanston to the Indiana State line, over 24 miles, and has an average width of 8 miles. The site is a level prairie, hardly broken by any elevation of more than a few feet. Originally the land bordering on the lake and river was little better than a swamp, the elevation above the lake datum not being more than seven feet. Through the town the two branches of the river meander, uniting within what is now the business district, and falling into Lake Michigan. About 1855, when the city had begun to attain considerable prominence as a shipping and commercial point, its population then being about 80,000, a great improvement was inaugurated. The entire level of the down-town district was raised seven feet, the houses and hotels being lifted by jack-screws, and the streets filled in. The work of filling in other quarters was carried on for many years, the result being that the entire level was raised beyond the reach of water and an adequate system of drainage provided. As the river, or bayou, for it is little else, had little or no fall to the lake, a cut of six feet was made through the limestone formation at the lower end of the South Branch of the stream connecting it with the Illinois and Michigan Canal. In consequence of this the Chicago river now empties into the canal or into Lake Michigan according to the stage of water. The river has become a canal and furnishes dockage for an immense fleet of steam and sail craft.

It being necessary to keep the river open for large vessels the bridges of Chicago are all of the draw pattern. There are some 50 of these bridges, most of them of iron and steel and operated by steam power. Two tunnels under the main and the south

branch, constructed originally for vehicular and pedestrian traffic, are now used by the cable railroads, and a third tunnel is almost completed. The scores of railroads, which have done so much to build up Chicago, enter the city for the most part on the street level. For the accommodation of traffic 35 massive viaducts have been constructed and many more are projected. The proposition to either depress or raise the grade of the railroads has been long debated, and some method of settling the question of improved terminal facilities will have to be adopted. Intramural traffic is carried on by means of cable lines, horse cars and electric railroads, the latter in outlying districts. Elevated railroads have been built, and in June, 1892, the first was put in operation. Including sidings and switches, Chicago has a larger mileage of surface railroads than any other city.

The total mileage of tracks in use by the several street railroad companies in 1892 was 392 miles.

Chicago has, as we have stated, an entirely level site, and, with its rapid and phenomenal growth, the problem of drainage and the disposition of sewage has become a leading one. In 1890 the legislature of Illinois provided for the creation of a drainage district, to be administered by commissioners elected by the people, who should devise a plan for a permanent drainage and sewerage system. The plan as adopted contemplates the construction of a drainage canal extending from Chicago to Lockport, 34 miles, and connecting with the Illinois river, and by that with the Mississippi. Alternative plans involving the utilization of the Illinois and Michigan Canal and the deepening of the Desplaines river have been suggested, while a strong effort is being made to construct the canal of sufficient dimensions to carry ocean-going ships, affording a direct waterway from the Great Lakes to the Gulf of Mexico.

The marvelous growth of Chicago is unrivaled in the history of cities, and it is extending as rapidly as ever. In 1837, when it was incorporated as a city, it had 4,170 inhabitants and the United States census of 1840 gave it 4,497. In 1850 it had almost reached the 30,000 mark; in 1860 it had 109,206 people. Ten years later the census showed 306,605 inhabitants. The great fire of 1871 and its successor of 1874, the financial panic of 1873 and succeeding years came and passed away without hindering the growth of the city, and in 1880 there were almost half a million people in the then city limits. From time to time these limits were increased, and in 1889 suburbs were annexed which gave the city an area of over 180 square miles. The last (1890) United States census gave a population of 1,099,850; the school census, more carefully taken at the same time, showed 1,208,669. Since that time, owing in part to the influx of workmen employed upon the Columbian Exposition buildings, but more largely to the natural growth and accession by immigration, not less than 150,000 have been added, and the year of the World's Fair will find 1,500,000 within the gates of the Garden City.

The most notable event in the history of Chicago was the fire of 1871, the largest of modern times. The conflagration commenced by the overturning of a lamp, in a district built up almost exclusively of wood, about 9 o'clock in the evening of Sunday, October 8, 1871; it continued through that night and the greater part of the next day, lapping up great blocks of houses, and growing by what it fed

on. It was finally checked by explosions of gunpowder in a line of houses on the south of the fire, and exhausted itself on the north by burning all there was to ignite. The area burned over in each division of the city was as follows: West division (in which the fire originated), 194 acres; South division, 460 acres; North division, 1,470 acres. The total area burned was 2,124 acres, or nearly  $3\frac{1}{2}$  square miles, about 4 miles in length, and from 1 to  $1\frac{1}{2}$  miles in width. The season had been excessively dry; the rainfall in Chicago for the summer had been only 28% per cent. of the average. There was a strong southwest wind, made a very sirocco by the heat, and taking irregular, fantastic and uncontrollable off-shoots and eddies, which spread the fire in all directions except west. The city fire department, though large and efficient, had been exhausted by an unusually extended fire the Saturday preceding, and the flames outran even their earliest efforts. Wooden buildings were scattered throughout the entire city, acting as brands to spread the conflagration. These were the main conditions of the fire. The total number of buildings destroyed was 17,450, and 98,860 people were rendered homeless; of the latter 250 perished in the flames or lost their lives from exposure. Thousands, flying before the flames, sought refuge in the lake, and remained standing in the water for hours as the only means of preservation against the intense heat and the showers of sparks and cinders. Among the buildings destroyed were the custom-house, post office, courthouse, chamber of commerce, and nearly all the churches, railway stations, hotels, banks, theaters, newspaper offices, and buildings of a quasi-public character. It is estimated that 73 miles frontage of streets were burned over, most of which had been improved with wood block pavements; these were partially destroyed. The total loss has been estimated at \$196,000,000—of which \$53,000,000 represented the value of the buildings destroyed, \$58,710,000 the personal effects, and the remainder business stocks, produce and manufactures of every description. On the losses there was insurance of \$88,634,122, of which about one-half was recovered. A vast system of relief was organized, which received the most generous aid from all parts of the world. The money contributions from the various States and from abroad were \$4,996,782; of this England contributed nearly \$500,000. These funds, which were over and above the contributions of food, clothing and supplies, were made to last, under the careful and honest administration of a society of citizens, till the close of the year 1876. Out of them temporary homes were provided for nearly 40,000 people; barracks and shelter-houses were erected, workmen were supplied with tools and women with sewing-machines; the sick were cared for and the dead buried; and the poorer classes of Chicago were probably never so comfortable as within two or three years after this fire. The work of rebuilding the city was accomplished with marvelous rapidity. Immediately after the fire, the most sanguine persons predicted that it would require at least ten years to restore the buildings that had been destroyed. But within three years the city was provided with buildings equal in capacity and of twofold value. The work was begun before the cinders were cold, and the population seemed to gain new ambition and new energy from the disaster. The "fire limits" were extended so as to prevent the erection of other than stone, brick or iron buildings within a large area, and subsequently this prohibition was applied to the entire city. The result has been to make new Chicago the most beautiful city in America in its business center.

But it is within the last five years that the architectural development of Chicago has been greatest and most marked. The construction of buildings of 12, 14 and even 18 and 20 stories has become so common that the erection of half a dozen new "skyscrapers" is hardly noticed. Office buildings containing from 400 to 600 rooms are common, and even larger buildings are projected. No city on earth can boast of such commercial buildings as Chicago, while the structures devoted to manufacturing purposes are unequaled anywhere. Side by side with this, the erection of public buildings and private residences has been carried on. As the frame structures years ago gave place to brick, so the latter have been replaced by artistic creations in stone, and by massive warehouses, factories and office buildings of steel with glass fronts or terra-cotta facings. An entirely new style of building has been inaugurated, and its results attract the attention of all. During the year 1891 there were constructed 11,805 new buildings, with an aggregate frontage of 282,762 linear feet, or over 53 miles, the cost being over \$54,000,000.

These buildings were distributed in the divisions of the city as follows:

| DIVISION.         | No. buildings erected. | Aggregate frontage in feet. | Estimated value. |
|-------------------|------------------------|-----------------------------|------------------|
| North.....        | 501                    | 15,187                      | \$4,496,300 00   |
| South.....        | 1,063                  | 32,322                      | 20,180,300 00    |
| West.....         | 3,691                  | 92,898                      | 12,613,500 00    |
| Hyde Park.....    | 2,163                  | 48,037                      | 8,260,100 01     |
| Town of Lake..... | 3,006                  | 62,799                      | 5,503,400 00     |
| Lake View.....    | 1,439                  | 31,429                      | 2,953,900 00     |
| Grand totals..... | 11,805                 | 282,762                     | \$54,001,800 00  |

The park system of Chicago is one of the most extensive in the world. Two parks are in the South division, one containing 372 acres, and the other 586 acres. The latter has a frontage on Lake Michigan of  $1\frac{1}{2}$  miles, and the two embrace 27 miles of interior drives and 50 miles of walks. The larger of the two has a series of interior lakes connected with Lake Michigan, and protected by a pier several hundred feet long, so that they may be reached by boats from the lake. The approaches to these two parks are two roadways, each 200 feet wide, known as Grand and Drexel Boulevards. The former may be compared to Rotten Row in Hyde Park, London; the latter is modeled after the Avenue de l'Impératrice, Paris, with a continuous stretch of floral ornamentation in the center. The West division parks, inside the city limits, comprise Humboldt Park, 200 acres; Garfield Park, 185 acres; and Douglas Park, 180 acres. The ornamentation is varied and elaborate. Lincoln Park, within the northern limits of the city, contains about 250 acres, and has a lake shore drive of several miles. All these parks are connected by wide roadways, varying from 150 to 300 feet in width, and giving a continuous drive of 35 miles. The parks are supplied with water from a number of artesian wells. Besides these principal parks there are the following public places in the different divisions of the city: Lake Park, 41 acres; Union Park, 14 acres; Jefferson Park, 6 acres; Washington Square, 2 acres; Union Square, 1 acre; Dearborn Park, 1 acre; Ellis Park, 3 acres; Vernon Park, 4 acres; Wicker Park, 4 acres; Gage Park, 20 acres. There are thus 1,975 acres, or more than three sections of land, set aside by Chicago for public grounds.



The city government of Chicago is vested in a Mayor and Common Council. Each of the thirty-four wards has two Aldermen, elected by popular vote; one-half the Aldermen retiring each year. The Mayor, City Treasurer and City Clerk are each elected for two years. The Mayor appoints all heads of departments and bureaus, such as the Comptroller, Commissioner of Public Works, Chiefs of Police and Fire Departments, and the like, subject to confirmation by the Council. The Council possesses all legislative power as to taxes, appropriations and the granting of franchises, subject to a veto on the part of the Mayor, which can be overruled by a two-thirds' vote. Under the constitution of Illinois the bonded debt of the municipality is limited to five per cent. of the taxable valuation. The township system of government has been retained and assessments are made and collected by town officers.

The water supply is derived from Lake Michigan by means of tunnels extending far out under the bed of the lake to "cribs," or inlets constructed for the purpose. The main pumping station is situated near the lake shore on Chicago avenue; there is another on Blue Island avenue, a third at Desplaines street, and a fourth at Fourteenth street and Indiana avenue. The former suburbs of Hyde Park and Lake View, now included in the city, have water works and tunnels of their own. The original system consists of two tunnels, one five feet and the other seven feet in diameter, into which the water enters through iron cylinders sunk into the bottom of the lake. At the shore end the water is pumped through a stand-pipe in a tower, which gives a head pressure of 105 feet. One of the tunnels is continued four miles through the city, passing under the Chicago river to the western pumping house, which is furnished with four powerful engines. The new four-mile crib is connected with the land by two tunnels, each six feet in diameter, and these will supply water to the new pumping works, now practically completed. The City owns its own water works, which have cost, up to January 1, 1892, \$19,061,000, and are estimated to be worth more than double that amount. The total receipts on water works' account to the same date were \$27,500,511, showing a gain to the city of \$9,416,321. The amount of water taxes for 1891 was \$2,364,433, and the number of gallons furnished was 63,552,000,000, which, on the basis of a population of a million and a half, allows for every man, woman and child 118 gallons per diem.

*The Great World's Fair.*—As the site of the great World's Columbian Exposition of 1893, Chicago has made itself known to the ends of the earth. The Exposition, which is intended to celebrate the quadricentenary of the discovery of the Western Hemisphere by Christopher Columbus, promises to be, both in magnitude and intrinsic importance, the greatest World's Fair ever known. It will be opened to the public on May 1, 1893, and will close on October 26 of that year. Dedictory services will be had on October 12, 1892, the anniversary of Columbus' first landing on American soil. The Exposition is conducted under the management of a National Commission, appointed by Congress, and a Local Board of Directors. A Board of Reference and Control, made up from the two organizations, settles all disputed questions. The affairs of the Local Board are delegated to committees, and the Exposition management proper is conducted by bureaus under the control of a Director-General. A Board of Lady Managers also participates in the administration. The Federal Government, every State and Territory of the Union, and over fifty foreign governments, ranging in importance from

Great Britain, France, Germany and Russia down will be represented as they never were before.

The Exposition buildings occupy all of the southern portion of Jackson Park lying between Stony Island avenue on the west, and Lake Michigan on the east, and extending south from Fifty-sixth to Sixty-seventh street. The Midway Plaisance running from Washington to Jackson Park on the line of Sixtieth street, and covering 80 acres, is also devoted to Exposition purposes. Altogether the grounds cover 664 acres, all of which have been magnificently improved by grading, draining, the construction of roads and sidewalks, and of lakes, canals, piers and sea-walls. The total area of the forty-five Exposition buildings is about 160 acres, and the gallery space extends over 45 acres more. The dimensions of the principal buildings are as follows:

| BUILDINGS.                         | Dimensions<br>in feet. | Floor<br>space,<br>acres. |
|------------------------------------|------------------------|---------------------------|
| Manufactures and Liberal Arts..... | 787 x 1687             | 30.5                      |
| Administration .....               | 263 x 262              | 1.6                       |
| Mines .....                        | 350 x 700              | 5.6                       |
| Electricity .....                  | 345 x 690              | 5.5                       |
| Transportation .....               | 266 x 960              | 5.6                       |
| Annex.....                         | 425 x 900              | 8.8                       |
| Woman's .....                      | 193 x 368              | 1.8                       |
| Art Galleries .....                | 320 x 500              | 3.7                       |
| " Annexes (2) .....                | 120 x 200              | 1.1                       |
| Fisheries.....                     | 165 x 365              | 1.4                       |
| " Annexes (2) .....                | 135 diam'r             | .6                        |
| Horticulture .....                 | 250 x 998              | 5.7                       |
| Greenhouses (3).....               | 34 x 100               | .5                        |
| Machinery .....                    | 492 x 846              | 9.6                       |
| Machinery Annex .....              | 490 x 550              | 6.2                       |
| " Power House .....                | 100 x 461              | ....                      |
| " Pumping Works .....              | 77 x 84                | .1                        |
| " Machine Shop .....               | 146 x 250              | ....                      |
| Agriculture .....                  | 500 x 830              | 9.2                       |
| Agriculture Annex .....            | 300 x 550              | 3.8                       |
| " Assembly Hall, etc .....         | 125 x 450              | 1.3                       |
| Forestry.....                      | 208 x 528              | 2.5                       |
| Saw Mill .....                     | 125 x 300              | .9                        |
| Dairy .....                        | 100 x 200              | .5                        |
| Live Stock (3) .....               | 65 x 200               | .9                        |
| Live Stock Pavillion .....         | 280 x 440              | .8                        |
| " Sheds .....                      | ....                   | 40.                       |
| Casino .....                       | 120 x 250              | .7                        |
| Music Hall .....                   | 120 x 250              | .7                        |
| U. S. Government .....             | 345 x 415              | 3.3                       |
| U. S. Imitation Battleship.....    | 69 x 348               | .3                        |
| Illinois State .....               | 160 x 450              | 1.7                       |
| Illinois Wings (2) .....           | ....                   | .3                        |

159.4

The building devoted to manufactures and the liberal arts is by far the largest under one roof in the world, and the immense girders which span its center aisle are two and a half times larger than any others in existence. This building has more than thirty acres of floor space, without counting its galleries. The Mining, Transportation, Machinery, Electricity, Horticulture and other buildings are all vast structures of brick, iron and glass. The walls are uniformly treated in imitation of white marble, being coated with a preparation known as "staff," which is incombustible. More than \$8,000,000 will be expended by the Exposition Company upon buildings, while foreign nations, the United States and the different States and Territories will each erect buildings for their own exhibits, and at their own cost. Several million dollars will be spent upon grading and filling and the construction of lakes, bridges and piers; on landscape gardening, electric lighting and the building of railways within the grounds. It is estimated that the Exposition will represent an expenditure of more than \$28,000,000 before the doors are opened to the public.

Aside from the buildings devoted entirely to the drama, Chicago possesses an infinite variety of public buildings and halls. First of these is the great Auditorium, completed in 1889, which cost, inclusive of the ground, \$5,000,000. This has a

street frontage of 710 feet, and is surmounted by a tower 270 feet high. The main hall, used for concerts, dramatic representations and public meetings, can seat 8,000 people. In this hall, before it was completed, was held the National Republican Convention of 1888. The Auditorium also finds space for an immense office building and a magnificent hotel of 400 rooms. Farwell Hall, the headquarters of the Young Men's Christian Association, Battery D Armory, the First Cavalry Armory, and nearly a hundred smaller halls, afford facilities for public meetings, balls, concerts and assemblies.

The hotels of Chicago are a household word the world over, and, owing to its magnificent hotel accommodations and its delightful summer climate, the city has become so much in demand for great public gatherings that it is popularly known as the "Convention City." No matter how large the crowds of visitors may be, accommodation is found for all. In view of the approaching Columbian Exposition vast accessions have been made, several hotels of from 300 to 800 rooms each having been built, while many more will be ready for occupancy before the opening of the fair. Of the best-known hotels there are the Palmer House, Grand Pacific, Sherman, Tremont, Leland, Richelieu, Wellington, Auditorium, Clifton, Briggs, Brevoort, Woodruff, Southern, Gault, Northern and Hyde Park. There are hundreds of family and European hotels, and thousands of boarding houses.

There are twenty-one recognized theaters in Chicago, besides a large number of museums, and other minor places of amusement. Of the leading temples of Thespis the chief are: McVicker's Theater, the Auditorium, the Chicago Opera House, the Haymarket, the Grand Opera House, Hooley's, the Columbia, Haylin's, the Casino, the Criterion, the Academy of Music, the Olympic and the People's Theaters. The New German Theater, just completed and to be opened to the public before the end of 1892, will undoubtedly be the finest theatrical building in the West.

Hospitals and charitable institutions abound in Chicago, and without exception are open to all in sickness and distress, no distinction of nationality or religion being made, although many of the institutions are under the management of denominational organizations. Cook County Hospital, one of the largest in the United States, is maintained by taxation and affords relief to over 500 resident patients. The Hospital buildings, which include a Detention Hospital for the insane, a Contagious Diseases Hospital and a Morgue, occupy twelve acres of ground in the West division. This is the quarter devoted to medicine. Hard by stand the Presbyterian Hospital with 175 beds, aside from its maternity and convalescent departments; the Chicago Homeopathic Hospital, the Hospital for Women and Children, and half a dozen medical colleges elsewhere named. Of other hospitals the chief are the Alexian Brothers, Augustana, Bennett, Chicago Emergency, the Floating Hospital in Lake Michigan, the German Hospital, Hahnemann, Hebrew, Maurice Porter, Linnæan, Mercy (under the charge of the Sisters of Mercy), Michael Reese, National Temperance, Provident, Railway Brotherhood, St. Elizabeth's, St. Joseph's, St. Luke's, St. Vincent's (infants' and maternity), Wesley Hospital and the Woman's Hospital. The United States Marine Hospital, for the special care of sailors, is situated in Lake View. There are twenty-eight free dispensaries in Chicago.

Of charitable institutions there is no end. Cook County appropriates a large sum every year for outdoor relief, distributed by the County Agent, and maintains a Poor House and infirmary at Dunning,

where nearly a thousand aged and indigent persons are sheltered. The County Insane Asylum is located at the same place. More than \$3,000,000 is subscribed every year for the support of deserving charities, of which a few only can be named, such as the Nursery and Half Orphan Asylum, Erring Women's Refuge, Foundlings' Home, German Old People's Asylum, Home for the Aged, House of the Good Shepherd (reformatory), Chicago Relief and Aid Society, Home for the Friendless, St. Mary's Training School for Boys, Waif's Mission, Washington Home, Seamen's Friend Society, Soldiers' Orphans' Home, Industrial School for Boys, Industrial School for Girls.

Chicago may justly lay claim to the title of the City of Churches, which both in number and architectural beauty rival those of any city. Every denomination is represented, the church edifices being located in all parts of the city, except the purely business district. The only down-town church is the First Methodist, although two flourishing congregations, those of Prof. Swing and Dr. Thomas, worship in the Central Music Hall and McVicker's Theater, respectively. The different denominations are represented as follows: Baptist, 35 churches, 8 missions; Congregational, 50 churches, 21 missions; Christian, 5 churches; Evangelical Association, 9 churches; Evangelical Lutheran (English), 4 churches; Evangelical Lutheran (Danish), 3 churches; Evangelical Lutheran (German), 27 churches; Evangelical Lutheran (Norwegian), 8 churches; Evangelical Lutheran (Swedish), 5 churches; Evangelical Lutheran (Separatists), 2 churches; Evangelical, United, 13 churches; Evangelical Reformed, 2 churches; Episcopal Protestant, 22 churches, 8 missions and chapels; Episcopal, Reformed, 15 churches, 3 missions; Free Methodist, 4 churches; Independent, 4 churches; Jewish, 16 churches; Methodist Episcopal, 53 churches; Methodist Episcopal (African), 6 churches; Methodist Episcopal (German), 12 churches; Methodist Episcopal (Bohemian), 2 churches; Methodist Episcopal (Swedish), 11 churches; Methodist Episcopal (Norwegian), 5 churches; Presbyterian, 39 churches, 20 missions; Presbyterian (United), 1 church; Roman Catholic, 90 churches; Swedenborgian, 1 church; Unitarian, 2 churches; Universalist, 7 churches; miscellaneous, 5 churches; making a total of 518 churches and missions in the city. The Catholic and Episcopalian churches have cathedrals. Chicago is the residence of the Catholic Archbishop and of the Episcopal and Reformed Episcopal Bishops.

Chicago has developed within the last fifteen years very largely in the direction of social clubs. Chief among these, and possessing a magnificent club building near the Post Office, is the Union League Club, with a membership of 1,200. The Chicago, Marquette, Ashland, La Salle, Calumet, Standard, Illinois, Iroquois, Lincoln, Grant, Hyde Park, Kenwood, Oakland, Union, Union Veteran and Washington Park Clubs, are among the most popular, most of them possessing fine club rooms and halls. Of athletic and sporting clubs the most prominent are the Chicago Athletic Association, the Farragut Boat Club, the Illinois Cyclists, the Argo Club, the Chicago, Evanston and Lincoln Park Yacht Clubs, several Cricket Clubs and a score or more of flourishing Cycling and Baseball Clubs. The Audubon, Mak-saw-ba, Tolleston and Gun Clubs are devoted to field sports. There are a number of State social organizations, such as the Sons of New York, Maine, etc.; half a dozen clubs like the Sunset, Commercial, Bankers' and Fortnightly, for the purposes of "dinner and discussion," and an endless procession of professional clubs. One of the best known of the latter is the famous Press Club



of Chicago, composed entirely of active newspaper workers, and probably the most democratic body ever organized. It has 250 members, and is about to build a very handsome house for its accommodation.

The Chicago Public Library was founded in 1872, its starting point being a contribution of several thousand volumes of books from English authors. It contains over 175,000 volumes and circulates over 1,300,000 volumes a year, while its reading and reference rooms are visited by more than half a million persons annually. The Newberry Library, which is intended for reference only, has some 80,000 volumes in its temporary home, while its magnificent permanent building, to cover an entire block, is rapidly approaching completion. The Crerar Library, like the Newberry, the gift of a patriotic citizen, has not yet found an abiding place, but will ultimately rival all others. Besides the club and literary association and private libraries may be named the Pullman, Ravenswood, South Chicago and Union Catholic and the very extensive libraries of the Universities, Colleges and other educational institutions.

Among the artistic sights of Chicago the chief is the Art Institute, which occupies a fine building on Michigan avenue. It contains an art museum and six picture galleries, and is open free on Saturdays and Sundays. A magnificent new building for the purpose is in process of construction on the Lake Front at a cost of \$600,000. There is a school of art connected with the Institute. The Chicago Society of Artists have studios in the Athenæum building, and the private collections of Chicago are numerous and well selected. Literature flourishes, for Chicago is the largest book-producing center in the United States, and aside from its daily newspapers, which are referred to elsewhere, it sends forth countless weekly and monthly publications. In this respect the progress of the last ten years has been phenomenal. Of literary clubs the chief are the Chicago Library, the Chicago Literary, the Twentieth Century, the Illinois Woman's Press Association, and the Papyrus Club.

Chicago possesses 24 daily, 260 weekly, and 65 miscellaneous publications, covering every field of newspaper enterprise. The morning dailies, the *Tribune*, *Herald*, *Times*, *Inter-Ocean*, *News-Record*, *Staats-Zeitung*, *Daily Skandinaven*, and *Freie Presse*, are newspapers of wide circulation, comparing favorably with metropolitan journals. Several of the afternoon papers have a great circulation, and the Sunday papers are marvels of journalistic ability. As a publishing center Chicago stands unrivaled in the United States. It is the home of encyclopædic and subscription books, of maps and atlases and of railroad printing.

The private residences of Chicago, mostly erected since the great fire, are largely of stone, and embrace every style of architecture. The principal avenues and the streets of the residential quarters present a handsome appearance. Lawns and gardens abound, the streets are wide and lined with shade trees, and as everything is new and well kept, the scene is extremely attractive. The homes of the working people, which are to a great extent owned by themselves, are of brick or frame, and are multiplying at a great rate. Stringent ordinances prevent the erection of frame buildings within certain limits, and the tendency is all in the nature of improvement. Thanks to the fire, which swept away so many thousands of old buildings, Chicago has few "slums," and even the poorest are comfortably housed. Within the past ten years, there has been an immense development of "flats" and apartment houses, many of the latter being of

gigantic proportions, and provided with every modern convenience and luxury. During the same period, the suburbs have filled up, until they, too, have become towns, only to be in turn absorbed by the ever-reaching arms of the mother city, whose limits have been several times increased, and now extend over 180 square miles of territory.

The bonded debt of Chicago on January 1, 1892, was \$13,530,350; water certificates outstanding, \$1,000,000. On the same day there was a balance in the city treasury of \$1,968,722. The total receipts for the year ending Dec. 31, 1891, were \$29,550,560; the total expenditures, \$28,115,931.

The fire department consists of 998 men under the command of a Chief and Assistant Marshals. There are (1892) 99 engine houses, 72 fire engines, 28 hook and ladder trucks, 23 chemical engines, 3 fire boats for service on the river and 1,917 fire-alarm boxes. It requires 421 horses to supply the engines.

The police department consists of 2,298 men, under the control of a Superintendent and his Assistants and Inspectors. There are 37 police stations, 15 patrol barns, each with one wagon; two ambulances and 179 horses are used in the service. There is a complete telegraph and telephone department with 640 miles of wire in use.

The city is lighted by gas and electricity, the former being furnished by incorporated associations and the latter furnished by the city itself. There are 70,076 street lamps, 993 electric lights, and 1,060 miles of wire in use.

The cost to the city for lighting by gas and electricity for the fiscal year 1891 was \$705,664.

The school system is controlled by a Board of Education, appointed by the Mayor. The school fund is a large one, being derived from the rental of property set apart for this purpose, in addition to an annual levy made by the City Council. On Jan. 1, 1892, there were 225 school buildings owned by the city, and 77 rented for school purposes. The average number of children attending the public schools was 126,326, besides over 70,000 pupils attending private schools. There are 3,200 teachers in the public schools. Over \$5,000,000 each year are set apart for school purposes. The school year consists of ten months, divided into three terms. The hours of attendance in the grammar and primary schools are 9 a. m. till noon, and 1.30 p. m. till 3.30 p. m. The principal studies in the grammar schools are theory of arithmetic, problems of arithmetic, geography, history of the United States, language, composition, reading, spelling, penmanship; drawing and music are also taught, and the study of German is optional. The course of studies in the high schools is that of the higher academies. Corporal punishment was abandoned altogether about the year 1865, and the reading of the Bible was discontinued in 1875, in deference to the dogmatic differences among the religious sects, the theory of the schools being free and secular. Of other educational institutions, besides over one hundred ordinary private schools, there are a large number of "Kindergarten" schools, in imitation of the favorite German system of elementary instruction.

Within the past ten or fifteen years the manufacturing interests of Chicago have developed an extraordinary and sustained advance, until now the city ranks as one of the most important centers of production in the United States. In the production of iron and steel, sawed lumber, meat products, leather, furniture and the textile fabrics, books and printers' supplies, Chicago ranks high. In 1892 there were 3,600 manufacturing firms with a capital of \$220,000,000; employing 190,000 work-

men and paying out \$110,000,000 in wages. The total value of Chicago manufactures in 1890 was over \$570,000,000.

The proximity of Chicago to the vast iron-ore producing district of Lake Superior and its convenience as a lake port have led to the establishment of several immense rolling-mills and rail-mills, while manufactures employing iron and steel in vast quantities have been established. There are 320 of these, with a capital of \$45,000,000, employing 35,000 men. About 150 industries connected with the brass, copper and other metal trades have an annual product of \$48,000,000. Electrical supplies, chemical works, tanneries, tool and bicycle factories, brush factories and cooper shops, are largely represented.

The internal revenue collections in the First District of Illinois for the year ending December 31, 1891, amounted to \$12,136,009, nearly \$8,000,000 being on account of distilled spirits, and \$2,224,671 on account of fermented liquors. Some of the largest distilleries and many great breweries are located here. The annual production of distilled spirits averages 10,000,000 gallons.

As a grain market, the fame of Chicago is world-wide. Its railroad and elevator facilities, its position on the lake and the enterprise of its merchants have made it the greatest primary grain market in the world. It has 27 elevators with a capacity of 30,075,000 bushels. The receipts of grain and flour in its grain equivalent in 1891 were 231,821,429 bushels, and 301,976 cars of grain were inspected in by rail, while 4,699,368 bushels were received by lake and canal. The shipments of flour and grain aggregated 207,987,762 bushels. The clearing-house report of the Board of Trade showed a volume of speculative grain business in 1891 never rivaled. During 1891 the total clearances were \$104,083,529, an increase of \$18,000,000 over the previous year.

The Union Stock Yards cover with their railroad tracks and sheds nearly four hundred acres, and are accessible by twenty railroads. The receipts of live stock during 1891 included 3,250,359 cattle, 2,153,537 sheep, 3,600,805, hogs and other cattle, aggregating 14,304,480 animals, valued at \$239,434,777, which required 304,706 cars for their transportation. The receipts of cured meats were 206,898,958 pounds, and the shipments 751,584,862 pounds. Of lard 74,021,945 pounds were received and 362,109,099 were shipped. The dressed beef receipts were 105,061,775 pounds, and the shipments 877,295,875 pounds.

The lumber trade, both in the rough and manufactured, is an immense one. In 1891 Chicago received 2,045,418,000 feet, and shipped 865,959,000. Of shingles 303,895,000 were received and 99,855,000 were shipped.

Chicago has a larger tonnage of shipping and more entrances and clearances of merchant vessels than any other port.

The arrivals and clearances during the past nine years were as follows:

| YEAR.      | ARRIVALS. |           | CLEARANCES. |           |
|------------|-----------|-----------|-------------|-----------|
|            | No.       | Tonnage.  | No.         | Tonnage.  |
| 1889 ..... | 11,203    | 3,555,586 | 11,271      | 3,743,574 |
| 1894 ..... | 10,513    | 3,481,957 | 10,640      | 3,489,666 |
| 1885 ..... | 9,846     | 3,347,647 | 9,910       | 3,364,169 |
| 1886 ..... | 10,180    | 3,546,309 | 10,267      | 3,594,549 |
| 1887 ..... | 10,828    | 3,568,465 | 10,920      | 3,989,615 |
| 1888 ..... | 10,158    | 3,990,921 | 10,308      | 4,134,064 |
| 1889 ..... | 9,552     | 4,417,415 | 9,462       | 4,402,634 |
| 1890 ..... | 9,088     | 4,244,502 | 9,284       | 4,429,654 |
| 1891 ..... | 8,956     | 4,569,596 | 9,144       | 4,698,320 |

## SOUTH CHICAGO.

| YEAR.      | ARRIVALS. |          | CLEARANCES. |          |
|------------|-----------|----------|-------------|----------|
|            | No.       | Tonnage. | No.         | Tonnage. |
| 1890 ..... | 860       | 707,670  | 801         | 634,225  |
| 1891 ..... | 847       | 870,188  | 784         | 724,864  |

The total arrivals in 1891 were 9,803 with a tonnage of 5,439,714; the clearances numbered 9,878 with a tonnage of 5,423,184.

The aggregate capital of the twenty-five National Banks is \$22,300,000; surplus, \$12,178,716. The twenty-four State banks have a capital of \$12,527,000, and a surplus of \$5,766,843. The National Bank deposits aggregate of \$133,713,539. The State and savings banks carry over \$55,000,000 of deposits. The total clearances of the associated banks of Chicago during 1891 were \$4,456,885,230.

The number of miles of railroad tributary to Chicago is 88,200. It is practically the terminal point of all the great trunk lines of the Union, east, west, north and south, and has direct connections with Canada and the Mexican Republic. Twenty great railroad systems center here, and in the movement of both passengers and freight the city ranks easily first. Within the last few years magnificent depots have been constructed by the different railroads, all of which run into the heart of the business section. A belt line connects or intersects all the trunk lines, thus permitting the transfer of freight from Western to Eastern or Northern roads without the necessity of passing through the city. The State of Illinois alone has over 15,000 miles of railroad, the greatest mileage of any of the United States, and of all this Chicago is the local center.

As a commercial center and distributing point for the entire West and Northwest, Chicago stands beyond competition. In dry goods, boots and shoes, books, chemicals, crockery and glassware, paper, groceries, manufactured lumber and iron; clothing, hats, tobacco and cigars; musical instruments, hardware, jewelry, coal, liquors, metal goods, carpets, cutlery and a hundred other articles, its wholesale and jobbing trade is enormous. Conservative estimates place the volume of its wholesale and jobbing business in 1891 at over \$600,000,000.

The receipts of the Chicago Post Office in 1891 amounted to \$3,693,877 and over 250,000,000 letters and postal cards were distributed during the year. Over 1,100 letter-carriers and 900 clerks are employed at the central office and the sub-stations or in the collection or delivery of mail matter.

Chicago is one of the most cosmopolitan of cities. Of its million and a half of people there are not less than 400,000 of German and 250,000 of Irish birth or extraction. The Bohemians, Poles, Swedes and Norwegians each claim from 50,000 to 60,000 representatives. There is a large French, English and Scotch contingent, several thousand Jews, Russians, Italians, Hollanders and Swiss, and some 1,200 Chinese were reported at the 1891 census.

The twenty-eight cemeteries of Chicago are all located in the immediate suburbs, and several, owing to the rapid growth of the city, are now within the corporate limits. All of these resting places of the dead are beautifully laid out and adorned with shrubs, trees and flowers. In 1891 there were 27,764 deaths in Chicago; the equivalent of 22.20 per thousand inhabitants. This will compare favorably with the mortuary statistics of any metropolitan city.



**CHICKADEE** (*Parus montanus* or *atricapillus*), a North American titmouse, of sober black and gray plumage and active habits. It is fond of pine trees, feeds on insect larvæ, has a hardy constitution and remains through the winter.

**CHICKAHOMINY**, a river in eastern Virginia, near which several battles of the civil war occurred. From April until July of 1862 the two contending forces confronted each other in the swamps and morasses of this river. Among the battles recorded are those of Williamsburg, Hanover Court House, Fair Oaks, Seven Pines, Cold Harbor, Savage's Station and Malvern Hill. In the seven days' fight at the end of June, the Confederate loss was double that of the Northern army, and if McClellan had but followed up his advantage he could have taken Richmond and ended the war. Two years later, in June, 1864, Grant drove Lee back upon the Chickahominy. Lee turned at bay, and in the second battle of Cold Harbor more than held his own.

**CHICKAMAUGA**, a tributary of the Tennessee River rising in Georgia, and flowing northwest into Tennessee, in which State the Confederate General Bragg defeated Rosecrans in a battle fought on the banks of the stream, Sept. 19 and 20, 1863.

**CHICKAMAUGA, THE BATTLE OF**, was fought Sept. 19-20, 1863, at a point about twelve miles from Chattanooga, Tenn., between the Union Army of the Cumberland under Rosecrans, and the Confederates under Bragg. Rosecrans was beaten, but Thomas held his own and saved Chattanooga. Nominally the victory rested with the Confederates, but they were unable to improve it, and after Rosecrans' supersession, Grant and Thomas evened matters up at Chattanooga, November 23-25, of the same year.

**CHICKAREE**, a popular name of the red or Hudson Bay squirrel, *Sciurus hudsonius*, which inhabits British America and the northern part of the United States.

**CHICKASAWS**, a tribe of North American Indians, now settled on a reservation of 6,840 square miles in the Indian Territory on the left bank of the Red River. According to their own tradition and the evidence of philology, they are closely connected with the Creeks and Choctaws; and they believe that they emigrated along with these tribes from the West, crossed the Mississippi, and settled in the district that now forms the northeast part of the State of that name. Here they were visited by De Soto in 1540. From the first they showed a hostile spirit against the French colonists, and frequently engaged with them in actual conflict. With the English, on the other hand, their relations were most satisfactory. In 1786 they made a treaty with the United States; and in 1793 they assisted the whites in their operations against the Creeks. In the early days of the present century part of their territory was ceded for certain annuities, and a portion of the tribe migrated to Arkansas; and in 1832-'34, the remainder, amounting to about 3,600, surrendered to the United States the 6,442,400 acres of which they were still possessed, and entered into a treaty with the Choctaws for incorporation with that tribe. In 1855, however, they effected a separation of this union, with which they had soon grown dissatisfied; and by payment to the Choctaws of \$150,000 obtained a complete right to their present territory. In the civil war of 1861-'65 they joined the Confederates and suffered in consequence; but their rights were restored by the treaty of 1865. In 1866 they surrendered 7,000,000 acres; and in 1873 they adopted their former slaves. They possess a governor, a senate, and a house of representatives, and maintain 14 schools with about 500 pupils.

**CHICKEN POX**, a contagious febrile disease, chiefly of children, and bearing some resemblance to a very mild form of Smallpox (q. v.). Chickenpox is distinguished by an eruption of vesicles or blebs, which rarely become pustular or yellow, and leave only a very slight incrustation, which falls off in a few days, leaving little or none of the marking or, pitting which is such a prominent feature in smallpox. From its vesicular character it has been called the *crystal pox*. It has been argued that chicken pox is, in fact, only smallpox modified by previous vaccination; but this opinion, though maintained on good authority, is not accepted by most medical men. It is a disease of little or no danger, the fever being often hardly perceptible and never lasting long.

**CHICKERING, JONAS**, piano manufacturer, born in New Ipswich, N. H., April 5, 1797, died in Boston, Mass., Dec. 6, 1853. He was the son of a blacksmith, began business life as a cabinet-maker, and became noted for the number and excellence of the pianos which he manufactured. His factory in Boston grew to be very extensive. Mr. Chickering patented many improvements in pianos, and was noted for his business enterprise, public spirit and benevolence. After his death the business passed into the hands of his three sons; the eldest, Thomas Edward (born in Boston, Oct. 22, 1824, died there Feb. 14, 1871), succeeded his father as head of the firm, and distinguished himself in the civil war. Charles Frank, second son (born in Boston, Jan. 20, 1827, died in New York city, March 23, 1891), after receiving his education entered his father's factory. He represented his father at the World's Fair in London in 1851, and made many improvements in the manufacture of pianos.

**CHICK PEA** (*Cicer*), a genus of the vetch tribe of Leguminosæ. The common chick pea (*C. arietinum*) is an annual, 1½ to 2 feet high, of a stiff upright habit, covered with glandular hairs, with inflated pods containing a few angular and wrinkled peas. It is largely cultivated in Southern Europe and in many parts of the East, and hence occurs frequently also as a weed in cornfields. It is also grown in Spanish America. Large quantities of the peas are exported from British India under the name of *gram*, now well known in commerce; but the name is extended to other East Indian kinds of pulse. The peas are used as food, either boiled or roasted, and are the most common *parched pulse* of the East. They are a notable article of Spanish and French cookery; while their importance in Roman times is evidenced by the phrase, *fricti ciceris emptor* ("buyer of roasted chick peas") as a conversational equivalent for a poor fellow. Its cultivation extends as far as Southern Germany; but in the climate of Britain it is found too tender to be profitable. The herbage affords fodder, and the seeds are one of the occasional substitutes for coffee. In summer weather drops exude from this plant, which, on drying, leave crystals of almost pure oxalic acid. The too free and prolonged use of chick peas as food is believed to be liable to become the cause of dangerous and obstinate forms of disease.

**CHICKWEED** (*Stellaria media*), one of the most common weeds of gardens and cultivated fields, is a species of Stitchwort. It is a native of most parts of Europe and of Asia, appearing during the colder months even on the plains of India; an annual, with a weak procumbent stem and ovate leaves, very variable; some of the smaller varieties in dry sunny situations sometimes puzzling young botanists from having no petals or only five or three instead of ten stamens; but always characterized by having the stem curiously

marked with a line of hairs, which at each pair of leaves changes from one side to another, and in four changes completes the circuit of the stem. The leaves of chickweed afford a fine instance of the *sleep of plants*, closing up on the young shoots at night. Chickweed is a good substitute for spinach or greens, although generally little regarded except as a troublesome weed, or gathered only by the poor to make poultices, for which it is very useful, or for feeding cage-birds, which are very fond of its leaves and seeds. A number of species of a nearly allied genus, *Cerastium*, also bear the name of Chickweed, or Mouse-ear Chickweed, and the name is occasionally given to other plants, either botanically allied, or of somewhat similar appearance.

CHICLANA, a pretty town of Andalusia, Spain, 12 miles SE. of Cadiz with a notable bull-ring and vineyards. Its mineral baths are much frequented. Population, 11,627.

CHICLAYO, a town of Peru, 12 miles SE. of Lambayeque, is the center of a valuable sugar district. Population, 11,325.

CHICO, a town of California, former county-seat of Butte county, situated on Chico Creek, ninety-five miles north of Sacramento. It is the trade-center of a fertile district, and an important shipping point for lumber. It is the seat of an academy, and contains a variety of manufactories.

CHICOPÉE, a city of Massachusetts (see *Britannica*, Vol. V, p. 614). Among the principal industries are the cotton mills of the Dwight Company, with a capital of \$2,000,000. The Chicopee River affords ample water power for the numerous mills and manufactories. There is a convent of the Sacred Heart, a high school, and several churches, and national and savings banks. Population in 1880, 11,516; in 1890, 14,007.

CHICORY, or Succory (*Cichorium*), a genus of Composite (sub-order Ligulifloræ), with few species, all herbaceous perennials, with spreading branches and milky juice, natives of Europe and West Asia. The Common Chicory or Succory (*C. Intybus*) is wild in England and most parts of Europe, growing in waysides, borders of fields, etc. It has a long carrot-like root, externally of a dirty or brownish-yellow color, and white within. The stem rises 1 to 3 feet, the leaves resembling those of the dandelion; the flower-heads are sessile, axillary, large (1 to 1½ inch), and beautiful, generally blue more rarely pink or white. Chicory is pretty extensively cultivated, both in England and on the continent of Europe, as also in California, for its roots, while its herbage is good food for cattle. The blanched leaves are sometimes used as a salad, and are readily procured in winter by placing the roots in a box with a little earth in a cellar. To this genus belongs also the Endive.

Chicory has been used as a substitute for coffee, or to mix with coffee, for at least a century. The roots are pulled up, washed, cut into small pieces, and dried on a kiln, which leaves a shriveled mass not more than one-fourth the weight of the original root. It is then roasted in heated iron cylinders, which are kept revolving as in coffee-roasting, during which it loses 25 to 30 per cent. of its weight, and evolves at the same time a disagreeable odor, resembling burned gingerbread. An improvement to the chicory during roasting is the addition of 2 lbs. of lard or butter for every cwt. of chicory which communicates to it much of the luster and general appearance of coffee. It is then hand-picked, to remove chips of woods, stones, etc., and is reduced to powder, and sold separately as *chicory powder*, or is added to ordinary ground coffee, and is sold as a mixture. Chicory contains a good deal of sugar,

but otherwise does not serve to supply the animal economy with any useful ingredient. It gives off a deep brown color to water when an infusion is made, and hence its main use in coffee.

CHIEF: in heraldry, an honorable ordinary formed by a horizontal line, and occupying the upper part of the escutcheon. Any object borne in the upper or chief part of the shield is said to be *in chief*, though the chief be not divided off from the rest of the field as a separate portion.

CHIEMSEE, a lake of Upper Bavaria, the largest in the country. It lies about forty-two miles southeast of Munich. It is twelve miles in length and nine miles in breadth, and is situated at an elevation of more than 1,500 feet above the sea.

CHIFF-CHAFF (*Sylvia hippolais*), a small species of warbler, of very wide distribution. Its general color is brown; the under parts lighter. Its song consists merely of a frequent repetition of two notes resembling the syllables chif-chaff.

CHIGNECTO BAY, an inlet at the head of the Bay of Fundy, in British North America. It separates Nova Scotia from New Brunswick, is thirty miles long and eight broad, and has an isthmus only fourteen miles in width between it and Northumberland Strait, in the Gulf of St. Lawrence.

CHIGNON (Fr., originally the nape "of the neck"), a general term for a woman's hair when gathered up into a roll on the back of the head and neck. The term is more particularly applied to such a roll when the hair is arranged over a pad.

CHIHUAHUA, the largest State of Mexico, bounded on the north and northeast by New Mexico and Texas; has an area of 83,746 square miles, and a population of about 226,000. In the east is the *Bolson del Mapima*, a vast desert of sand and alkali plains; in the south and west the surface is mountainous, and there are numerous rivers. The State is better adapted for stock raising than for agriculture; the fertile districts are mainly confined to the valleys and river-courses. Cotton is grown in the south. The silver mines were for centuries among the richest in Mexico, and though many are now abandoned mining is still the chief industry. The State is traversed by the Mexican Central Railway. The capital, Chihuahua, 225 miles south of El Paso by rail, rises like an oasis in the desert, among roses and orange-groves. It is well built, and is the center of considerable trade with Texas. Founded in 1691; population, 12,116.

CHILBLAINS, localized inflammations of the skin which occur in cold weather, and affect the hands and feet, more rarely the ears or nose. They are at first bright red, but as they disappear assume a purplish tinge. Sometimes they break and give rise to ulcers, which are slow to heal. They occur most frequently in young people, affect women more often than men, and are generally associated with weak health and sluggish circulation. They are often extremely irritable and painful, especially when the affected part has been chilled and is quickly warmed again.

CHILD, LYDIA MARIA, author, born in Medford, Mass., Feb. 11, 1802, died in Wayland, Mass., Oct. 20, 1880. She was the daughter of Richard Francis, and the wife of David L. Child, journalist. At the age of seventeen she wrote her first novel, and five years afterward became editor of the "Juvenile Miscellany." The following year she married. William Lloyd Garrison interested Mr. and Mrs. Child in the subject of slavery, and soon after Mrs. Child began to write on the question. For her action in befriending so unpopular a cause she was for a time socially ostracized. From 1840 to 1843 she edited the "National Anti-Slavery Standard" in New York city, and the following year



assisted her husband to edit the paper. When John Brown was a prisoner at Harper's Ferry, she sent a letter offering her services as nurse. Mr. Brown declined, but asked her aid for his family, and she responded to the request. Mrs. Child was the author of many books, among which were: *The History of Women; Letters from New York; Fact and Fiction; Looking Toward Sunset; and The Progress of Religious Ideas.*

CHILD, SIR JOSIAH (1630-99), an eminent London merchant, and writer on commerce and political economy. His principal work is entitled, *Brief Observations Concerning Trade and the Interests of Money*, published in 1690.

CHILDREMAS, or HOLY INNOCENTS' DAY, observed in the Roman Catholic and Anglican churches on the 28th of December, to commemorate the slaughter of the children by order of Herod.

CHILDERS, HUGH, an English statesman, born in London in 1827. He went to Australia about 1850, and was a member of the government until 1857. He became a lord of the admiralty in 1864; chancellor of the duchy of Lancaster in 1872; secretary of war in 1880; chancellor of the exchequer in 1882; and home secretary in 1886.

CHILDREN, SOCIETY FOR THE PREVENTION OF CRUELTY TO, a society organized in the city of New York in 1874 by Henry Berg and his associates, and chartered under the laws of the State of New York. Its purpose is specially stated in its name. Up to Jan. 1, 1891, the society had investigated 53,784 complaints, involving 161,936 children; 18,480 cases were prosecuted, resulting in 17,477 convictions, and the relief of 28,950 children. The present chief officers (1891) are: Eldridge T. Gerry, president and counsel; Courtland V. Anable, attorney; and E. F. Jenkins, secretary and superintendent; with vice-presidents, and a board of fourteen additional directors. There were in 1891 about 300 other similar societies in the world, of which there were in the United States ninety-six, all organized since the parent society in New York was founded.

CHILDS, GEORGE W., an American publisher and philanthropist, born at Baltimore in 1829. He became a partner in a publishing house in Philadelphia in 1849; and in 1864 he bought the "Public Ledger," of that city, with which his name has been since identified.

CHILI, or CHILE (República de Chile). See Britannica, Vol. V, pp. 616-24. For the purposes of local government the republic is now divided into provinces, presided over by intendants; and the provinces into departments, with gobernadores as chief officers. According to the rearrangement of 1887 there are twenty-three provinces, subdivided into sixty-eight departments and one territory. The Senate, of thirty-seven members, is elected by the provinces for six years; the chamber, of 109 members, by the departments for three years, by electors possessing a small property qualification. The latest census, that of Nov. 26, 1885, gives the area of the republic as 298,970, and the population as 2,665,926. The estimated population in 1890 was 2,715,400, including about 50,000 American Indians and Auricians. The capital is Santiago, with a population of 236,412. The revenue of the republic for 1889 was 46,000,000 pesos, and the expenditures 53,000,000 pesos. The imports for 1889 amounted to 65,090,013 p., and the exports to 65,963,100 p. The public debt of Chili Jan. 1, 1889, was 93,617,955 p. Tobacco-growing and the production of raw silk have been attempted of late years, but only with indifferent success. About 1,500,000 of the population are engaged in agriculture. Chili produces annually about 21,000,000 bushels of

wheat; 24,000,000 gallons of wine; 40,000,000 tons of copper; 335,000 lbs. of silver; 1,000 lbs. of gold; and 10,000,000 tons of coal. A large amount of capital is also employed in the nitrate industry, the production of nitrate in 1888 amounting to 800,000 tons. By an act passed in 1887 the army is limited to 5,885 men. Besides this regular army there is a national guard, composed of citizens, numbering 48,530 men.

The Chilian navy consisted in 1890 of two iron-clads, each of 2,033 tons; a monitor of 1,130 tons; two corvettes of 1,101 tons; one corvette of 1,075 tons; two gun-boats of 660 and 775 tons; a cruiser of 3,000 tons; another of 465 tons; 10 torpedo-boats of from 40 to 400 horse-power. At this writing (1891) two cruisers of 2,080 tons each are building in France, and two torpedo-boats are building in England. There is a good naval college in Valparaíso. The expenses of the national armament are paid out of the revenue from nitrate.

In 1890 there were published in Chili 400 daily, weekly, monthly or intermittent periodicals. The presidential term of office is for five years; and the president cannot be reelected until after an interval of one term. For the last six terms he has practically named his own successor—a fact which caused great criticism, and created a powerful party against the administration. Early in 1891, large number, including a majority of the naval forces, began an insurrection for the overthrow of the government, and it has gone forward constantly increasing in strength until this writing (April 1, 1891), at which date there seems little promise for the survival of the governmental administration.

CHILI SALTPETER, a commercial name applied to the nitrate of soda.

CHILLICOTHE, a city of Missouri, county-seat of Livingston county, about seventy-five miles east of St. Joseph. It is the chief town of the Grand River Valley, and has manufactories of machinery, lumber, and flour, and is the seat of an academy.

CHILLICOTHE, a city of Ohio, and county-seat of Ross county (see Britannica, Vol. V, p. 624). The Ohio Canal, and the Marietta and Cincinnati, and Sciota Valley Railroads pass through the city. The court-house is a fine stone edifice. There is also a high school, public library, and numerous manufactories of carriages, paper, machinery and farming implements. Population in 1880, 10,938; in 1890, 11,256.

CHILLON, a celebrated castle and fortress of Switzerland, in the canton of Vaud. It is situated on the east end of the Lake of Geneva, on an isolated rock, almost entirely surrounded by deep water, and is connected with the shore by a wooden bridge. The castle is said to have been built in 1238, by Amadeus IV of Savoy. It long served as a state prison, but is now used as a magazine for military stores.

CHIMBORAZO, "Mountain of Snow," a conical peak of the Andes, in Ecuador, 20,517 feet above the sea. The first successful attempt to reach the summit was in 1880, when Whymper twice made the ascent. See Britannica, Vol. VII, p. 645.

CHIMESE, a bishop's upper robe, to which the lawn-sleeves are attached. That of Anglican bishops is of black satin, that of English Roman Catholics is of purple silk.

CHIMNEY. See Britannica, Vol. IV, p. 466.

CHINA, the great empire of Eastern Asia. For its history, topography, productions, government, and religion, see Britannica, Vol. V, pp. 626-72. The area in 1891 was reported as 4,179,559 square miles, and the population as 404,180,000, including dependencies; the population of China proper was

estimated at 383,000,000, and the number of square miles at 1,297,999. The reigning emperor, Tsait-jen, born in 1871, who succeeded to the throne Jan. 22, 1875, at the death of Tung-chi, rules under the style of Kwangsu, and is the ninth emperor of the Manchu dynasty. The late emperor, dying suddenly in the eighteenth year of his age, did not designate a successor, and it was in consequence of arrangements directed by the empress dowager that the infant son of Prince Ch'un was made the nominal occupant of the throne. There were two dowager empresses concerned in the arrangements—the eastern and the western. The western still lives, and has lately withdrawn from power. Having become of age the young emperor nominally assumed government in 1887, but did not assume full control until February, 1889, when the other empress dowager withdrew. He was married Feb. 26, 1889.

No official reports are made of the receipts and expenditures of the government. The annual average estimates, however, place the amount at about \$125,000,000, the income being derived from taxes on land, grain, salt, and customs duties. The expenditure of the government is mainly for the army. China had no foreign debt until the beginning of 1875, when it contracted a debt of about \$3,000,000, secured by the customs revenue. Since that date it has increased the debt as follows: In 1873, about \$8,000,000; in 1884, about \$7,000,000; in 1886, about \$12,000,000; and in 1887, about \$1,250,000. The total external debt was estimated on Jan. 1, 1891, at \$20,000,000.

Its army statistics in 1891 were reported as follows: (1) The Eight Banners, including Manchus, Mongols, and Chinese reached a total of 323,800. Of these 100,000 are supposed to be reviewed by the emperor at Peking once a year. (2) The Ying Ping or national army, having 6,459 officers and 650,000 privates. The pay of the infantry is from \$1 to \$2 per month, and the cavalry receive about \$5 per month, out of which each man must feed his horse, and replace it if the one originally supplied by the government is not forthcoming. China has lately acquired a considerable navy, the ships of which are of an advanced type.

In the eighteen provinces there are now 8,000 offices for post-carts, and scattered over the whole of the Chinese territories are 2,040 offices for runners. There are also numerous private postal couriers.

**CHINESE EXCLUSION QUESTION.** The United States Treasury Department in the annual report to Congress, Dec. 10, 1891, took a decided stand on the question of the law excluding the Chinese from the United States. Complications have been caused by the enactment of a law amendatory of the original law, and the enactment of another law, which, if operative, would repeal both the earlier acts. The first law was passed in 1882 and amended in 1884, while the last act was approved in 1888 and was virtually to repeal the others. Judge Field of the United States Supreme Court in May, 1891, defined what the Treasury Department regards as the only authority for the Chinaman to enter the United States. He said that the only admissible evidence was the certificate prescribed by the Act of 1882, as amended by the Act of 1884, and he ignored entirely the Act of 1888. The Attorney-General is thought to regard this latter act as inoperative, since its provisions were made dependent upon the ratification of a treaty with China, a diplomatic action not yet taken. Five Federal Judges have included the Act of 1888 in their decisions, and by virtue of its provisions have rewarded prisoners to Canada instead

of to China. The action taken was the result of an appeal provided for only in this last act. The language of the law is to the effect that where the Chinese are found here unlawfully they shall "be returned to the country whence they came," and these Judges held that "the country whence they came" was Canada.

The Treasury Department officers think that if any evidence is required to show the intention of Congress it is to be found in the appropriation bill providing the means for enforcing the Exclusion Acts, in which bill a certain amount is set aside for the payment of the salaries of officers to be employed to enforce the act "and to defray the expense of returning to China, persons of that nationality found in this country unlawfully. There are questions of construction regarding this exclusion law coming up continually and the Secretary has made a decision in one of the most important of the many which have been presented to the Department. The Collector of Customs at Burlington, Vt., raised the point whether the Chinese should be inspected at the first stations this side of the Canadian line where the railroads stop, or whether measures should be taken to prevent the actual crossing of the line. The matter is of great interest to the Grand Trunk and Canadian Pacific Railways, and the representatives of these roads also wrote to the Department for some decision as to the liability of the roads in the transportation of Chinese seeking admission into the United States. It appears that the Federal officials had suggested to the agents of these roads that their respective companies were violating the Chinese Exclusion law when they conveyed to points in the United States persons of that race who were not lawfully entitled to enter its territory. Acting Secretary Spaulding, in his letter to the Collector at Burlington, says:

"The act approved July 4, 1884, provides in Section 11 that "any person who shall knowingly bring into or cause to be brought into the United States by land, or who shall aid or abet the same, or aid or abet the landing in the United States from any vessel, of any Chinese person not lawfully entitled to enter the United States, shall be deemed guilty of a misdemeanor, and shall, on conviction thereof, be fined in the sum not exceeding \$1,000, and imprisoned for a term not exceeding one year." Under the provisions of this section, all persons concerned in the unlawful importation of Chinese by railroad or by other means are clearly amenable to the penalties therein prescribed, and it is suggested that you so advise the proper officials of all railroad companies whose lines enter your collection district from Canada. Hereafter you will report to the District Attorney for his official action any instance where Chinese persons are brought by rail into your district who are not furnished with the certificates required by Section 6 of the act, together with the names of the names of the railway officials responsible for their transportation.

In reply to the Collector's intimation that the necessary inspection of persons and papers cannot be made before arrival at the first port of entry Mr. Spaulding says:

The law is mandatory and prohibits the entrance into the United States of Chinese not legally entitled to the privilege. The inspection of trains for the purpose indicated must, therefore, be made at the border, and you should instruct your officers accompanying the trains to make inspection in such manner as not to interfere unnecessarily with the railway schedules.

**CHIPPEWA FALLS**, a flourishing city and railroad junction of Wisconsin. It is located on Chippewa River, and is the county-seat of Chippewa county. The city has water, gas, and electric light works. Here are several mills, and lumber is extensively manufactured.

**CHIRRA POONJEE**, a town in the northeast of India. It stands on the Cossya hills, at the height of 4,200 feet above the sea. The vicinity abounds in mines of coal and iron.



**CHIRIQUI**, a division of the department of Panama, Colombia; area, 6,500 square miles; population, 43,000. Also a lagoon 90 miles long and 50 in width, with a depth of water for the largest ships on the north coast of Central America, and a river flowing towards the north, the latitude and longitude of its mouth being 9° N., and 82° 30' E.

**CHISELHURST**, a village in Kent, 11 miles south-east of London. Sir Nicholas Bacon was a native of Chiselhurst. Camden Park estate (now built over) was the residence of Camden, the antiquary. Napoleon III died at Camden Place in 1873; his remains and those of the Prince Imperial were removed to Farnborough in January, 1888. There are here an orphanage and a governesses' benevolent institution.

**CHITALDRUG**, the chief town of the district of the same name, in Mysore, India, situated 126 miles northwest of Bangalore. It has manufactories of coarse blankets and cotton cloth. The military cantonments have been abandoned on account of their unhealthfulness. Population, 4,271. The district of Chitaldrug is the least populous in the Mysore states, and is remarkable for its low, rainfall and arid, stony soil. Area, 4,871 square miles; population, 376,310.

**CHITIN**, an organic substance which forms most of the hard parts of crustaceans and insects. It is an amorphous, white substance, containing nitrogen, but free from sulphur. It is unaffected by digestive ferments, by water, hot or cold, by alcohol or ether. It may, however, be dissolved by strong mineral acids (hydrochloric or sulphuric), and prepared from the cleaned exoskeleton of a lobster, or preferably from the pen of a squid. Chemically it is regarded as a derivative of carbohydrates.

**CHITON**, a family of gasteropodous mollusks of the order *Cyclobranchiata*, sub-order *Polyplacophora*. The shell is composed of eight narrow, calcareous pieces, overlapping one another in a row along the back, and strongly attached to the mantle, which is remarkably fleshy and fibrous. There are over 200 known species, found all over the world, adhering to rock-like limpets.

**CHITTAGONG WOOD**, a name somewhat vaguely used by cabinet-makers; usually the wood of *Chickrassia tabularis*, a tree of the order *Cedrelaceae*, a native of the mountainous countries to the east of Bengal. It is often beautifully veined and mottled.

**CHITTOR**, a fortified town of India, in the district of Odeypoor, or Mewar. The fortress occupies the summit of an isolated rock nearly 6,000 yards in length and 1,200 in breadth.

**CHITTOR**, a town of India, in the district of Arcot, about 80 miles west of Madras, on the right bank of the Puni, about 1,100 feet above the sea.

**CHIVALRY**, a social arrangement of mediæval life in Christian Europe, of which knighthood formed a central feature. It included everything relating to martial accomplishments and the relation between vassal and lord, then the chief bond of society. With regard to the position of the female sex and domestic life, it developed sentiments and manners which had a powerful and salutary effect on modern society, although it is true that the high ideal standard of morals which it cultivated was not always fully exemplified in the lives of those who were trained under its influence. Though closely connected with feudalism its germ has been traced to a much earlier age.

In English law, chivalry is used to mean the tenure of lands by knight's service, which might be general or special, according as the tenant was bound to perform military service generally or some particular service.

The *Court of Chivalry* was a military court, established by Edward III., of which the earl marshal and the lord high constable were judges. It tried military offenses and decided questions of personal honor, questions as to coat-armor, and the like; it sat for the last time in 1737.

**CHIZEROTS** and **BURINS** form one of those peculiar races in France that live isolated in the midst of the rest of the population, and are despised and hated by their neighbors. They are found in the arrondissement of Bourg-en-Bresse, in the department of Ain, and the communes of Sermoyer, Arbigny, Boz and Ozan belong to them. According to tradition they are descended from the Saracens. Although industrious and prosperous, they are held in the utmost contempt and detestation by their peasant neighbors, who are themselves often indolent and destitute. They are looked upon as covetous and malicious, and scarcely would the daughter of a small farmer or well-to-do day laborer become the wife of one of them, so that they mostly marry among themselves. From time immemorial they have been field-laborers, cattle-dealers, butchers, and the like.

**CHLORANTHACEÆ**, a small group of aromatic and stimulant plants, chiefly tropical, allied to the peppers. *Chloranthus inconspicuus* is the Chu-lan of the Chinese, who use it for perfuming teas.

**CHLORIMETRY**, the process of estimating the proportion of "available chlorine" in bleaching powder, which may vary from 20 to 40 per cent. The term *available* applies only to that portion of the chlorine which is easily liberated, and which takes part in the bleaching process.

**CHLORITE**, or **RIPIDOLITE**, an abundant mineral, consisting of silica, alumina, magnesia and protoxide of iron, in somewhat variable proportions. It is of a green color (see *Britannica*, Vol. XVI, p. 413), and occurs now and again crystallized in minute hexagonal plates, or in aggregates of small leaflets, either singly or disposed in radial groups, which are scattered over the joint-surfaces of certain rocks, or may occur in a thin incrustation upon other minerals. It is rather soft, and is easily broken or scratched with a knife.

**CHLORITE-SCHIST**, a green schistose rock, in which chlorite is abundant in foliated plates, usually blended with minute grains of quartz, and often with feldspar, mica, talc, or magnetite.

**CHLORITIC MARL**, a thin bed of white or pale-yellow marl, sometimes indurated, containing dark-green glauconitic grains, phosphatic nodules, and iron pyrites. It belongs to the Cretaceous system, coming between the Upper Greensand and Chalk Marl.

**CHLOROSIS**, a peculiar form of anæmia or bloodlessness, common in young women, and connected with the disorders incident to the critical period of life. It has been called the *green sickness*, from the peculiar dingy greenish-yellow hue of the complexion; the green color, however, is not always present. The disease is attended with very great debility, and often with breathlessness, palpitation and other distressing or even alarming symptoms. In a few cases it is associated with imperfect development of the larger arteries, and is then incurable; but in the vast majority of cases it yields readily to treatment unless complicated with some other disease.

**CHOATE**, **RUFUS**, advocate and orator, born in Essex, Mass., Oct. 1, 1799, died in Halifax, N. S., July 13, 1859. He graduated at Dartmouth in 1819, was tutor in the college during the following year, studied law at Cambridge, and afterwards in the office of William Wirt in Washington, who then held the office of attorney-general. Returning to

Salem he was elected to Congress in 1830, where he remained until 1834, at which time he resigned and went to Boston. In 1841 Daniel Webster was called to the cabinet of President Harrison, and Mr. Choate was elected to his place in the United States Senate. Here he made several brilliant speeches, among which were those on the Oregon boundary, the tariff, and the proposed annexation of Texas. Resigning his seat, Mr. Choate returned to his legal business in Boston. After Webster, he was considered the leader of the Massachusetts bar. Mr. Choate died while he was on his way to Europe for the benefit of his health. A musical voice, winning personality, learning, good judgment and a quaint humor were among the elements of his popularity.

**CHOCTAW INDIANS.** See *Britannica*, Vol. V, pp. 680-81. See also **INDIANS, AMERICAN**, in these *Revisions* and *Additions*.

**CHOKE-CHERRY**, a name given to certain nearly allied species of cherry, natives of North America, having small fruit in racemes like the bird-cherry or cherry-laurel, from which latter, however, they are easily distinguished by their deciduous leaves. The fruit is at first rather agreeable, but afterwards astringent in the mouth.

**CHOKE-DAMP**, also called *after-damp* or *foul-damp*, the carbonic acid gas given off by coal which accumulates in coal mines, and may suffocate those exposed to it. It is distinguished from *fire-damp*, the marsh-gas or light carbureted hydrogen which causes the explosions.

**CHOKING**, in its slighter forms, a very familiar occurrence, resulting from a morsel of food or other solid, or even a drop of liquid, passing into the larynx or upper opening of the wind-pipe, instead of the gullet. It is generally caused by a breath being suddenly drawn in coughing, laughing, etc., while food or fluid is in the mouth. Sometimes a larger mass is drawn into the opening of the wind-pipe, completely blocking it, and arresting respiration altogether. This condition is one of extreme danger; the sufferer becomes purple in the face, and if not at once relieved will speedily die of suffocation.

In *cattle* the causes fall under two heads: (1) those that depend on the material swallowed; and (2) those that depend on the animal swallowing. Under the first head we find sharp-pointed objects which become fixed into or entangled in the membrane lining the throat and gullet; solid masses too large to pass on to the stomach; dry farinaceous materials which clog in the passage. The second class of causes consists in inflammation of the throat, or irritation of the organs of deglutition; constrictions of the passage; ulceration of the œsophagus, which is apt to follow choking, and is the cause of a relapse; lastly, without any disease of the deglutitory organs an animal may be choked by eating too greedily, and imperfectly masticating or salivating its food.

**CHOLERA.** See *Britannica*, Vol. V, pp. 682-84.

**CHONOS ARCHIPELAGO.** See *Britannica*, Vol. XVIII, p. 352.

**CHOPIN**, an old English liquid measure equal to half a pint. The Scotch *chappin* was nearly an English quart. The German *schoppen* is a pint.

**CHOPIN, FREDERIC FRANÇOIS.** See *Britannica*, Vol. V, pp. 685-86.

**CHOPINE** (Spanish, *chapin*), a high clog or patzen formerly worn by women under the shoe, the height being regulated in accordance with the rank of the wearer. It was of Oriental origin, having been introduced into Venice from Turkey, and thence into England during the reign of Elizabeth. Some chopines were half a yard high, resem-

bling a short stilt; they were covered with leather, many of them being decorated with painting or gilding. The term came later to be applied to the shoe and clog combined.

**CHORALE.** Though the name is occasionally applied to the psalm and hymn tunes of similar character used in the Protestant churches of France and Britain, it most properly belongs to the melodies sung to the metrical hymns of the German Reformed church, and introduced by Luther, by whom and his friend Walther the first collection of importance was produced in 1524, and entitled the *Enchiridion*. The settings were in four, five or six parts, the melody, as with all the old choral hymns and psalms, being given to the tenor. They possess in common a solemn, dignified and devotional character. In Germany they are now usually sung very slowly and heavily in unison with organ accompaniment.

**CHORAL SERVICE**, the musical service of the Church of England, celebrated by a full complement of clergymen, lay clerks, and choristers, when all those parts of the service are sung or intoned as ordered in the rubrics.

**CHORD.** The chord of an arc is a straight line joining its two extremities; or a chord in a circle, ellipse, parabola, etc., is a straight line joining any two points in a curve.

**CHORLEY, HENRY FOTHERGILL**, musical critic, born at Blackley Hurst, England, Dec. 15, 1808, died Feb. 16, 1872. He was educated in Liverpool, and in 1833 became a member of the staff of the "Athenæum," and soon after assumed charge of the musical department, from which he retired in 1868. He contributed also many literary reviews. Chorley was author of three acted dramas, and some graceful verse, but his chief works are *Music and Manners in France and Germany* (1841), and *Thirty Years' Musical Recollections* (1862).

**CHOSE IN ACTION** (Fr., *chose*, "a thing"), one of the two great classes of what the law calls *chattel-personal*. The one class is "choses in possession," such as goods, household furniture, cattle, etc.; the other class is "choses in action," such as the right to sue for a debt, a legacy, damages, etc. The old common-law rule was that, except in the case of negotiable instruments, contracts could not be assigned so that the assignee might sue in his own name; but the assignee must bring his action in the name of the assignor or cedent, so that the assignee was always exposed to every defense which might have been stated against the original debtor under the contract. Now, every *legal chose in action* is absolutely assignable if express notice in writing be given to the debtor, and in some States a chose in action may not only be assigned, but the assignee may bring suit for possession in his own name; while in others the name of the assignor is used as plaintiff in the action to the use of the assignee. Courts of law generally follow the rules of equity in this respect.

**CHOUTEAU, AUGUSTE**, pioneer, born in New Orleans, La., in 1739, died in St. Louis, Mo., Feb. 24, 1829. His brother Pierre was born in New Orleans in 1749, died in St. Louis, July 9, 1849. The young men made a trip northward from their native city in 1763, reaching Ste. Genevieve, Mo., and afterwards they ascended the river some sixty miles and founded a trading station on the present site of the city of St. Louis.

**CHRESTOMATHY**, a name for books of selections from foreign languages, usually provided with glossary, and notes for the use of learners.

**CHRETIEN DE TROYES**, an old French poet, of whose life nothing more is known than that he lived in the second half of the 12th century, and was



a favorite poet at the court of Mary, daughter of Louis VII. He worked up the legends of the Round Table into numerous spirited poems, which had a wide literary influence, and were translated by the German minnesingers, Wolfram von Eschenbach, Gottfried of Strasburg, and others.

**CHRISM**, the name given to the oil consecrated on Holy Thursday, in the Roman Catholic and Greek churches, by the bishop, and used in baptism, confirmation, ordination, and extreme unction. There are two kinds of chrism—the one, a mixture of oil and balsam, is used in baptism, confirmation, and orders; the other, which is merely plain oil, is used in extreme unction.

**CHRISOME**, the name of the white linen cloth laid by the priest on the child in Roman Catholic baptism to signify its innocence. By olden usage it was generally presented by the mother as an offering to the church, but if the child died before the mother was "churched" again it was used as a shroud. By a common abuse of words, chrisome came to mean the child itself, being first applied in the old bills of mortality to denote such children as died within the month of birth.

**CHRISTADELPHIANS**, a small religious body which arose in the United States about the middle of the 19th century. The Christadelphians (or "Brethren of Christ") claim to represent the true faith and practice of Apostolic times, as revived by Dr. John Thomas, of Brooklyn, N. Y., the leading advocate of their views, who was born in England in 1805 and died in 1871. They deny the existence of a personal devil, and the immortality of the soul, believing in "conditional immortality," to be bestowed upon the faithful of all ages when Christ returns. They insist on the plenary inspiration of the Bible, the real death of Christ as a sacrifice for sin, his resurrection and ascension, and look for his return to the earth to reign on the throne of David over the converted and restored twelve tribes of Israel and all nations. They believe that death is a state of entire unconsciousness, terminated by a corporeal resurrection for those who have become related to Christ through faith and obedience, or are responsible for his rejection. Those accepted after the judgment reign forever with Christ over the nations; those rejected die the second death. Communities of Christadelphians exist in the principal towns of Great Britain, Ireland and the United States.

**CHRISTENING**, a term often used as equivalent to baptism.

**CHRISTIAN ALLIANCE**, a religious association organized in 1887, with its headquarters at 692 Eighth Avenue, New York city. It was founded by Rev. A. B. Simpson, who, at this writing (1891), has been its president from the date of its organization. Its membership, as described by its founder, "consists of all professing Christians who subscribe to its principles, and enroll their names." Its objects are stated to be "wide diffusion of the Gospel in its fullness, the promotion of a deeper and higher Christian life, and the work of evangelization, especially among the neglected classes, by highway missions and any other practical methods." The organization is said to be rapidly extending, especially throughout the United States and Canada. Auxiliary to the parent Alliance, is the "International Missionary Alliance," with a missionary training school located at 690 Eighth Avenue, New York city. Rev. A. B. Simpson is also corresponding secretary of the Missionary Alliance. At the opening of the year 1890, the secretary reported having established 23 missionaries in India, China, Japan, Hayti and Congo Free State. In New York city special work is done for fallen girls by means

of "the Door of Hope," a branch "home" opened by the Alliance.

**CHRISTIAN II** (1481-1559), king of Denmark, Norway and Sweden, born at Nyborg, in the island of Funen, in 1481, and mounted the throne of Norway and Denmark in 1513. In 1520 he overthrew at Bogesund the brave regent of Sweden, Sten Sture the younger, and thereafter was crowned king. But his ferocious passions, and especially his treacherous massacre in the Stockholm "blood bath" of the foremost men in Sweden, roused such a spirit of opposition in that country that he was speedily driven out by the young national leader, Gustavus Vasa, himself the son of one of the victims. Assisted by Charles V, Christian landed in Norway in 1531, but at the battle of Aggerhuus next year was totally defeated, and spent his remaining years in imprisonment at Sonderburg and Kallundborg, where he died in 1559. See *Britannica*, Vol. XXII, p. 747.

**CHRISTIAN IV**, king of Denmark and Norway, and duke of Sleswick-Holstein, born at Frederiksborg, in Zealand, in 1577, died at Copenhagen, Feb. 28, 1648. He was elected successor to the throne in 1588. He assumed the government of the duchy in 1593, and of the kingdom in 1596. He labored earnestly for the improvement of his country, and his legislative and financial reforms, together with his love and patronage of the arts and sciences, gained for him the affection of his people.

**CHRISTIAN COMMISSION**, an organization formed at the call of the Young Men's Christian Association in New York city, Nov. 14, 1861, for the purpose of looking after the spiritual and temporal welfare of the volunteer soldiers in the Union army. George H. Stuart, a well-known Christian merchant of Philadelphia, was president of the organization throughout the war; and thousands of the ministers and most active laymen of the churches of the North gave their personal services in connection with the humane work of the Commission upon the field of battle, on the march, in camp, and in the hospital.

**CHRISTIAN CONNECTION**, or **UNION**, an American religious denomination which originated about the beginning of this century in North Carolina, Vermont, Kentucky and Tennessee, on the basis of the Bible as the sole authoritative rule of faith and practice, with open fellowship to all Christians of whatever creed, personal piety being the only test of qualification for membership.

**CHRISTIAN KNOWLEDGE, SOCIETY FOR PROMOTING**, one of the great religious associations connected with the Church of England, and the oldest of them all. It was founded in 1698, although it did not receive its present name till 1701, and had for its objects: "(1) To promote and encourage the erection of charity schools in all parts of England and Wales; (2) to disperse, both at home and abroad Bibles and tracts of religion; and, in general, to advance the honor of God and the good of mankind by promoting Christian knowledge both at home and in other parts of the world by the best methods that should offer." These objects it has never ceased to pursue, chiefly directing its efforts to the British dominions. The Protestant missionaries who labored in the south of India in the 18th century were supported chiefly by this society, and it is now fully engaged in supplying to the mission field throughout the world needful religious literature in the vernacular.

**CHRISTIAN SCIENCE**, a system of religion founded by Rev. Mary Baker Glover Eddy, president of the Massachusetts Metaphysical College in Boston, Mass., and chartered in 1881. The founder claims that as early as 1866 she discovered meta-

physical healing emanating from the Divine Mind, and named it Christian Science; that the Principle thereof is Divine and Apodictical, governing all; that all real Being is the Divine Mind and Idea; that the Science of Divine Mind demonstrates that Life, Truth, and Love are all-powerful and ever present; that the opposite of Truth, named Error, is the false supposition of a false sense; that Mind governs all, not partially but supremely, and that the Mind's control over man is a demonstrable science; that it is capable of healing sickness and sin, and so destroying the foundations of death. The platform adopted by the society claims God as Supreme Being, the only Life, Substance, and Soul, the only Intelligence of the Universe, including Man; that neither God nor the perfect man can be discerned by the human senses; that the individuality of Spirit is unknown; that God is a Trinity consisting of a Trinity in Unity, Life, Truth, and Love; the same in essence, though multifarious in office; God the Father, Jesus the Type of Sonship, Divine Science, or the Holy Comforter—these three expressing the threefold essential nature of the Infinite; that Jesus the Christ was a mediator between humanity and Spirit; that he voiced Truth; that God is all-inclusive, and is reflected by everything real and eternal; that the word Christ is not properly a synonym for Jesus, though commonly so used; that it expresses God's spiritual, eternal idea, being synonymous with Messiah; that Jesus was a corporeal, or bodily existence, but the Christ was incorporeal, and the dual personality continued until the Master's Ascension; that then the human, the corporeal concept, or Jesus, disappeared, while the invisible, the spiritual idea, or the Christ continued to exist in the eternal order of Divine Science, taking away the sins of the world, as the Christ has always done, even before the human Jesus was incarnate to mortal eyes; that Spirit is infinite; that there is but one Spirit, because there can be but one Infinite, and therefore but one God; that there is no evil in Spirit, because Spirit is God; that Soul and Spirit are one; that God is Soul; and Soul is not corporeal, but a Divine Principle; that sin, sickness, and mortality are inharmonious, the opposite of Mind, and contradictions of reality; that Mind is Divine, the only Ego, and the Ego is deathless and limitless; that the Divine Ego or individuality is all-inclusive Being, that Being is God; that God is personal, and that in its scientific sense, but not in any anthropomorphic sense; that the Science is demonstrably true, for it heals the sick and sinful as no other system can; that, rightly understood, it leads to eternal harmony, and brings to light the eternal and true God, and man as made in His likeness; that the basis of all health, sinlessness, and immortality is the great fact that God is the only Mind; that sin, sickness, and death are error, and to conquer error is to deny its verity; that to get rid of sin through science, is to divest sin of any supposed mind or reality, and never to admit that sin can have intelligence or power, pain or pleasure.

The "tenets" or "creed" of the Society, and its church, which is called "the Church of Christ (Scientist)," is as follows:

"First.—As adherents of Truth, we take the Scriptures for our Guide to Life.

"Second.—We acknowledge one Father, Son and Holy Ghost—one God, the brotherhood of man, and Divine Science—and the forgiveness of sin, which is the destruction of sin; and the atonement of Christ, which is the efficacy of Truth and Love; and the way of salvation marked out by Jesus, which is healing the sick, casting out devils (evils),

and raising the dead—uplifting a dead faith into Life and Love."

CHRISTIANSFELD, a settlement of Moravian brothers in Northern Sleswick, founded in 1772. Population, 700.

CHRISTISON, SIR ROBERT, D. C. L., LL.D., Scottish physician and toxicologist, born at Edinburgh, July 18, 1797, died January 23, 1882. In 1819 he proceeded to London and Paris, and in the French capital studied toxicology under the celebrated Orfila. He was in 1822 appointed professor of Medical Jurisprudence in the University of Edinburgh, and in 1832 was promoted to the chair of *Materia Medica*, which he occupied till 1877, when he retired. He was appointed physician-in-ordinary to the Queen in 1848; president of the Edinburgh Royal Society (1868-73); and created a baronet in 1871. Besides contributing papers on various subjects to medical journals, Christison wrote a *Treatise on Poisons* (1829); *Biographical Sketch of Edward Turner, M. D.* (1837); a treatise on *Granular Degeneration of the Kidneys* (1839); and *The Dispensatory: a Commentary on the Pharmacopœias of Great Britain* (1842).

CHRISTOPHE, HENRI (1767-1820), king of Hayti, the Pacific, lat. 19° 57' north, long. 157° 27' west. It has good anchorage, and is the headquarters of an American guano company. Another Christmas Island, annexed to Britain in 1888, lies about 250 miles southwest of Java. It is 6 miles long by 4 broad, composed of coral masses piled up on a volcanic substratum, and is partially covered with luxuriant vegetation. There is a third Christmas Island in the Bras D'Or, Cape Breton.

CHRISTOPHE, HENRI, 1767-1820, king of Hayti, born a slave on the island of Granada, Oct. 6, 1767. He joined the black insurgents against the French in 1790, and, from his gigantic stature, energy and courage, soon became a leader among them, and was appointed brigadier-general. In 1802 he gallantly defended Cape Hayti against the French. In 1807 he was appointed president of Hayti. In 1811 he was proclaimed king of Hayti, by the name of Henri I, and ruled with vigor; but his avarice and cruelty led to an insurrection, and, deserted by his body-guard and all his nobles, he shot himself, Oct. 8, 1820. See *Britannica*, Vol. XI, p. 545.

CHRISTOPHER, a saint of the Roman Catholic and Greek churches. According to the oldest form of the legend, he is said to have lived in Syria, and suffered martyrdom under the Emperor Decius (249-251). He is reported to have been 12 feet high, and of prodigious strength. In the pride of his strength he would serve only the mightiest upon earth. After being some time in the service of a king and seeing his master's dread of the devil, he gave himself to be the devil's servant. One day, however, he saw the devil trembling before an image of Christ, and he resolved thenceforth to serve Christ only. For his penance he undertook to carry pilgrims across a broad unbridged stream. One day Christ came to him in the form of a child to be carried over, but the burden grew ever heavier and heavier, until it was almost too much for him to reach the farther shore. "Marvel not Christopher," said the child, "for with me thou hast borne the sins of all the world." In painting and sculpture the saint is usually represented with the infant Christ upon his shoulders, leaning on a great staff, and straining every nerve to support his weight. The Greek church celebrates his festival on the 9th of May, the Roman Catholic on the 25th of July.

CHRIST'S HOSPITAL, Newgate Street, London, founded on the site of the Greyfriars' Monastery by Edward VI, June 26, 1553, as a hospital for orphans.



**Children** are admitted between eight and ten years of age, and discharged between fifteen and sixteen, according to their school position, excepting the "Grecians" (i. e., the highest class of scholars in the hospital), of whom five are sent annually on various scholarships to the Universities of Oxford and Cambridge. Altogether about 1,180 boys and 90 girls are now upon the foundation. The governors are the patrons of several churches, chiefly in Surrey and Essex. Most of the building perished in the great fire of 1666, but it was soon rebuilt under the superintendence of Sir Christopher Wren. In the course of time the new hospital fell into decay, and in 1825 a third structure was erected by Mr. Shaw. The great hall of the hospital is a magnificent room, second only to that of Westminster. Christ's hospital is essentially a classical institution, Latin and Greek being the basis of education; but, to satisfy the wants arising from the changed condition of society, the modern languages, drawing, science, etc., are also taught.

**CHRISTY**, EDWIN P., born in 1815, died in New York city, May 21, 1862. The original "Christy's Minstrels" were organized by him in Buffalo, in 1842, and as manager of the troupe in America and London he amassed a fortune. He died insane.

**CHROMATIC**, in music, a term applied to notes in melodic progression which are raised or lowered by accidentals, without changing the key of the passage, and also to chords in which such notes occur. The chromatic scale is one proceeding by semitones alone.

**CHROMATIC**, in optics, that part of the science which deals with the colors of light and of bodies.

**CHROMATOPHORES**, pigment cells containing pigment granules of various colors. It is by contraction and expansion of these cells that chameleons and cuttle fishes are enabled to change color rapidly.

**CHROMATYPE**, a photographic picture, in which the paper employed has been sensitized by some of the salts of chromium.

**CHRONICLE**, a history in which events are treated in order of time. Most of our older histories were called chronicles, such as the *Saxon Chronicle*, *Holinshed's Chronicle*, *Baker's Chronicle*. The name is also given to two historical books of the Old Testament.

**CHRONICLES**, Books of. See *Britannica*, Vol. V, pp. 706-9.

**CHRONOGRAM**, or **CHRONOGRAPH**, a whimsical device of the later Romans, by which a date is given by selecting certain letters among those which form an inscription, and printing them larger than the others. The principle will be understood from the following example, made from the name of George Villiers, first Duke of Buckingham:

GEORGIVS DVX BVCKINGAMLE.

The date MDCXVVIII (1628) is that of the year in which the duke was murdered by Felton at Portsmouth. Another well-known example conveys the date in the inscription upon a medal struck by Gustavus Adolphus in 1632:

CHRISTVS DVX; ERGO TRIVMPHVS.

**CHRONOGRAPH** ("time marker" or "recorder"), an instrument to note, within a certain fraction of a second, the instant when a particular event occurs. The most recent are electrical, now indispensable to astronomers, since the transit of a star can, by touching a stud, be noted to within  $\frac{1}{100}$ th of a second of time. The typical form of the chronograph is a cylinder which revolves once a minute, and carries on its surface a sheet of paper divided all round into equal parts, indicating fractions of a second. If, for example, the cylinder is

thirty inches round, it is evident that very minute sub-divisions of time are attainable. A valuable application of the chronograph is for determining the longitude—e. g., in trigonometrical surveys. Thus two observers note simultaneously the transit of a star, say at Washington and Indianapolis (and that without any reference to right ascension or declination), and having telegraph as well as chronograph determine very easily the difference of time with an accuracy never dreamed of formerly.

**CHRONOSCOPE**, an instrument contrived by Sir Charles Wheatstone to measure the duration of certain short-lived luminous phenomena, such as the velocity of light, or the electric spark, of which the eye itself can be no judge, owing to the persistence of impressions on the eye after the cause of sensation has ceased. The phenomenon is observed by reflection in a mirror in such rapid motion that the image of the luminous object would appear to describe a circular arc the length of which must be a measure of the duration of the light.

**CHRYSALEIS**, or **CHRYSALEID**, a term originally applied to the golden-colored, resting stages in the life-history of many butterflies, but sometimes extended to all forms of pupæ or nymphs—that is, to the second stages in the history of insects which undergo complete metamorphosis. It is the stage which results from the fasting quiescence of the generally active and voracious larvæ or caterpillar, and also, of course, the stage which after one or rarely two months awakens into the winged insect or imago.

**CHRYSANthemum** (Gr., "gold flower"), a genus of plants of the natural order *Compositæ*, sub-order *Corymbifera*, having a hemispherical or nearly flat involucre, with imbricated scales, which are membranous at the margin, a naked receptacle, the florets of the disc tubular and hermaphrodite, those of the ray strap-shaped and female, the fruit destitute of pappus. The species of this genus are annuals, perennials, or shrubby, and all have leafy stems.

**CHRYSELEPHANTINE**, the art of making statues jointly of gold and ivory, extensively practiced among the Greeks. It developed out of the art of wood-carving, the draperies of the wooden figures being gilded for ornament, while the faces, hands, etc., were painted white. Then the uncovered parts of the body came to be made of marble, producing acroliths, and ultimately ivory was used, with gilding or gold-plating. The bulk of the figure continued to be made of wood, or wood and clay; thin gold plates were fastened over the parts intended to represent clothing, while on the fleshy parts small plates of ivory were skillfully laid.

**CHRYSID**, "golden-wasp," a genus of hymenopterous insects, type of a family *Chrysidæ*. Their systematic position is not far from that of the true wasps. They delight in sunshine and may be seen poised in the air—the motion of their wings being so rapid as to render the body alone of the insect visible.

**CHRYSOBALANUS**, a genus of trees and shrubs, natives of tropical and subtropical America and Africa, of which there are probably only two species. The cocoa-plum, *C. Icaco*, of tropical America, produces an edible fruit.

**CHRYSOBERYL**, a gem almost as hard as sapphire, and the finer specimens of which are very beautiful, particularly those which exhibit an opalescent play of light. It is of green color, inclining to yellow, semi-transparent, and has double refraction. It occurs crystallized in six-sided prisms; often in macles, or twin crystals. It is found occasionally in granite, but more frequently in gneiss and mica-schist. See *Britannica*, Vol. XVI, p. 386.

It is composed of alumina, glucina, and small proportions of ferric oxide, titanic acid, and sesquioxide of chromium—the alumina being about 80 per cent. of the whole. The chrysoberyl of the ancients was a different mineral, probably the Chrysoprase, of the moderns.

**CHRYSLITE**, a mineral composed of silica, magnesia, and protoxide of iron; of a fine yellowish-green color, with vitreous luster; transparent, and having double refraction; in hardness, about equal to quartz; and with conchoidal fracture (see *Britannica*, Vol. XVI, p. 410). It often crystallizes in four-sided or six-sided prisms, variously modified. *Olivine*, or common chrysolite, is an important rock-forming mineral. It is dark yellowish-green in color, and occurs generally in somewhat rounded grains or corroded crystals in some igneous rocks, such as the basalts.

**CHRYSTYPE**, a photographic process, the result being produced mainly by a solution of chloride of gold.

**CHUCK-WILL'S-WIDOW**, a bird found in the southern parts of the United States, so called from its note, which is repeated like that of the whippoorwill, and which resembles the syllables of its name very distinctly articulated. The bird is of the family *Caprimulgidae*.

**CHUDLEIGH, CAPE**, on the north coast of Labrador, at the entrance of Hudson Strait, 60° 12' N. lat., 65° 25' W. long.

**CHUFFUCK, SAMUEL W.**, inventor, born in Vermont in 1800, died in Utica, N. Y., June 28, 1875. In 1845 he engaged in the manufacture of telegraph instruments in Utica, and is said to have made the first one. The "pony" sounder and circuit-closer attachment to the key were his inventions. He was also a collector of rare coins.

**CHUMBUL**, a river of Central India, rising in the Vindhyan Mountains, at a height of 2,019 feet above the sea, and entering the Jumna after a generally northeast course of 650 miles.

**CHUNAM**, the Indian name for a very fine kind of quicklime made from calcined shells or from very pure limestone, and used for chewing with betel, and for plaster.

**CHRONOLOGICAL OUTLINE** of Historical Events. See *Britannica*, Vol. V, pp. 709-54.

1876.—Colorado admitted into the Union, March 11. Queen Victoria proclaimed Empress of India, May 1. Centennial exhibition opened at Philadelphia, May 10. Sioux Indian massacre of Federal troops, June 25. French decree of amnesty for Communists, June 28. Centenary of American Independence, July 4.

1877.—United States electoral commission appointed, January 30. Rutherford B. Hayes declared elected, March 2; inaugurated, March 5. First Turkish parliament, March 19. Great railroad strike in the United States, July 18-30. Trial of Russian Nihilists began October 31.

1878.—Paris International Exhibition opened, May 1. Attempted assassination of the Emperor of Germany, June 2. Berlin treaty signed, June 13. Yellow fever raged in the Southern States, September and October. United States paid the Fisheries' debt under protest, November 28. Gold sells at par in Wall street, December 17.

1879.—United States resumes specie payment, January 1. Zulus defeat English in South Africa, January 12. McMahon resigns the presidency of the French Republic; Jules Grévy succeeds, January 30. Bill admitting women to practice in the Supreme Court passes Senate, February 7. *Jeannette* sails from San Francisco for North Pole, July 9.

1880.—Winter Palace at St. Petersburg blown up by dynamite, February 17. Work of tunneling Mont St. Gothard completed, February 29. Prince Bismarck resigns, April 17. International Fishery Exhibition at Berlin, April 10. International Exhibition at Brussels, June 1. Mount Vesuvius railway opens, June 6. French Republic expels Jesuits, June 20. Cologne cathedral (commenced in 1228) completed, August 14. International Exhibition at Melbourne, October.

1881.—Chilians take Lima, January 17. James A. Garfield inaugurated President of the United States, March 4. Alexander II of Russia assassinated March 13. Attempted assassination of Garfield, July 2. Garfield died September 19. Vice-President Chester A. Arthur inaugurated 21st President of the United States September 22. Cotton exhibition

opened at Atlanta, October 25. *Jeannette* survivors heard from, December 20.

1882.—Guiteau found guilty, January 25. Attempted assassination of Queen Victoria by Roderick McLane, March 7. Assassination in Dublin of Lord Cavendish and Burke, May 3. Guiteau hung June 30. Alexandria bombarded by British fleet, July 11. Great floods in Germany, November 27. Transit of Venus, December 6. Arabi Pasha exiled, December 13.

1883.—Great floods in Rhine Valley, January 2. Great eruption of Mount Etna, March 23. Phoenix Park murderers executed at Dublin, May-June. Brooklyn Bridge opened, May 24. Coronation of Edward III of Russia, June 1. Cholera, mortality in Cairo, Egypt, July 19. Great strike of telegraphers in the United States, July 19-August 18. United States Arctic relief steamer *Proteus* crushed in Smith's Sound, July 23. French begin hostilities in Anam, August 17. Death of Count de Chambord, Bourbon claimant, August 24. Volcanic eruption devastates Java, destroying 50,000 lives, August 22-26. O'Donnell, assassin of Garfield, the informer, reached London for trial, September 20. Rediscovery of comet of 1812, September 22. Hurricane at Nassau N. P. (100 vessels destroyed), September 25. Army of Egypt annihilated by El Mahdi, November 3-5.

1884.—England assumes protectorate over Egypt, January 7. Destructive hurricane in Great Britain and Ireland, January 23. Baker Pasha suffers severe defeat in Sudan, February 24. Tornado crosses Georgia, Tennessee, Missouri, Mississippi, Illinois and Indiana, February 20. *Jeannette* explorers reach New York, February 22. General Graham defeats Egyptian rebels at Teb, February 20. Dynamite explosions in London, March 1-15. French capture Bac Ninh, March 14. English troops recalled from Egypt, March 31. Steamship *Daniel Steinhilber* wrecked off Halifax (121 lives lost), April 4. Two thousand Soudanese massacred by Arabs at Shendi, April 16. Steamer *State of Florida* collides with bark *Ponema* in mid-Atlantic, sinking both vessels (100 persons drowned), April 18. Severe earthquake in Eastern England, April 22. The *Bear*, the advance ship of the second Greeley relief expedition, sails from New York, April 24. The *Thetis*, second ship of the expedition, sails May 7. Financial panic in New York (several banks suspending), May 12-16. Petroleum discovered near Quetta, India, June 15. Steamships *Gijon* and *Lazhar* collide near Corunna, sinking both (180 lives lost), July 21. British ministry ratify the annexation of New Guinea by Australian Confederation, July 31. Great Britain determines to rescue Gen. Gordon at Khartum, September 1. Hurricane devastates Yokohama and Tokio, September 15. British government liberate "Tichborne claimants" October 20. New Guinea formally annexed to Great Britain, November 6. Congo conference meets in Berlin, November 15. Earthquakes in Malaga, Spain, destroy villages, drown 2,000 persons, December 23-31.

1885.—English in Egypt defeat Mahdi's troops near Metemneh, January 17. Khartum captured by Mahdi and Gen. Gordon killed, January 26. War opens between Nicaragua and Guatemala, March 11. Half-breed insurrection under Louis Riel, N. W. Territory, March 27-28. French reverses in Tonquin, March 30-April 6. Peace signed in Central America, April 15. King Leopold of Belgium assumes title "Sovereign of the Congo," April 28. Riel captured, May 16. Revised Old Testament published, May 22. El Mahdi dies of small-pox, June 16. Lord Salisbury forms a new cabinet, June 18. Two thousand lives lost by Cashmere earthquake, June 18-20. Great strike of car conductors and drivers in Chicago, June and July. Niagara State Park thrown open to public, July 13-17. Death of Gen. Grant, July 23. Cholera ravages in Spain (5,000 dying daily), August 15-25. *Puritan* outfalls *Genesta*, August 14. Eastern Roumelia annexed by Bulgaria, September 19. Hell Gate blown up by dynamite, October 10. Hurricane in Labrador destroys hundreds of lives, October 27. Vice-President Thomas A. Hendricks, of United States, and King Alfonso XII of Spain die, November 25. Jules Grévy re-elected President of France, December 1.

1886.—Mr. Gladstone forms a new cabinet, February 2. Great street-car strike in New York and Brooklyn, March 3-5. Fighting between Anarchists and police in Chicago, May 4. Tornadoes and floods devastate central portion of United States, May 11-15. Great eruption of Mount Etna, May 16. President Cleveland married, June 2. General election riot in Dublin, July 6. Gladstone defeated by Conservatives and Unionists, July 30. Prince Alexander abdicates throne of Bulgaria, August 30; reelected on the throne, September 1; but finally abdicates, September 5. Statue of Liberty on Bedloe's Island unveiled, October 28. Valuable discoveries of gold in Australia announced, November 25. Freycinet cabinet resigns in France, December 3. M. Goblet forms French ministry, December 8.

1887.—Queen Victoria's Jubilee year opens, January 1. Stanley starts on his expedition to relieve Emin Bey, January 18. German elections result in favor of Bismarck, February 14-20. Emperor William of Germany celebrates 90th birthday, March 22. British government introduces new coercion bill for Ireland, March 28. The Goblet ministry of France resigns, May 17. *Cetina* and *Britannica* collide (several lives lost), May 19. M. Rouvier forms French ministry, May 28. Cyprus ceded by Turkey to England, June 1. Queen Victoria's jubilee celebrated in London, June 19-25. King Kalakaua in Hawaii deposed, July. Irish coercion bill passed, July 4. Dr. McGlynn excommunicated by the Pope July 15. Prince of Wales accepts title of Prince of Wales, August 15. Exhibition opened at Atlanta, Ga., October 10. Great



fire at Han-Kow, China (1,000 lives lost), October 17. Alliance between Austria, Germany, and Italy prolonged for five years, October 26. Four of the Chicago anarchists hung, November 11. French president Grévy resigns, November 26. M. Sadi Carnot elected President of Germany, December 16. December 2. Baracra, Cuba, devastated by a tidal wave, December 22. Powder explosion at Amoy, China (800 lives lost), December 31.

1888.—Pope Leo XII's Jubilee begins in Rome, January 1. Frightful blizzard in Western States, January 13-14. The Fisheries Convention signed in Washington, February 15. Emperor Wilhelm of Germany died, March 9. Great blizzard in Eastern States, March 11. Disastrous floods in Germany and Hungary, March 19. Great earthquakes in China, April 23. Trans-Caspian Railroad opened to Samarcand, May 26. Emperor Frederick II of Germany dies, June 15. President Diaz of Mexico reelected, July 14. Yellow fever appears at Jacksonville, Florida, and became epidemic, August 15. Lord Sackville, British Minister at Washington dismissed by President Cleveland, October 30. England annexes the Cook Islands, November 20. Jacksonville Board of Health raises quarantine, December 4. Panama Canal Co. fails, December 14. British troops rout the Arabs at Suakin, December 20. Portuguese blockade Eastern coast of Africa, December 31.

1889.—Oklahoma bill, making a new territory in the United States, passes Congress, February 1. French Chambers dissolve Panama Canal Co., February 4. Great earthquake shocks in South America, March 4. Great hurricane in Samoan waters, wrecking six men-of-war, March 29. Centennial Anniversary of the founding of the United States Government celebrated in New York, April 29, 30, and May 1. Conemaugh Valley flood, May 30. Samoan Treaty signed in Berlin, June 14. Gen. Hipolyte chosen President of Hayti, October 17. Brazil proclaimed a republic, November 15. Stanley arrives at Zanzibar with Emin Bey, December 6.

1890.—New Extradition Treaty between United States and Great Britain, ratified by United States Senate, February 18. Congress selects Chicago as site of the World's Fair, February 24. Seynoid Ali, brother of the late Sultan of Zanzibar, succeeds to the throne, February 18. New Peruvian cabinet formed, February 13. Battle between Mwanga assisted by Europeans, and King Kalema, for throne of Uganda, Africa, reported, February 14.—annihilating forces of the latter. German elections result in enormous gains for Socialist party, February 20. Battle between French and King of Dahomey's troops at Kotonou, Senegal, repulsing the latter, February 24. German victory in Africa, under Wissmann, January 4. Dr. Palolo elected president of Venezuela, March 7. Treaty of Commerce between Germany and Austria signed at Constantinople, August 26. Tokay, Hungary, destroyed by fire (1,000 families made homeless), August 26. Kenesha, Russia, nearly destroyed by fire, August 28. Mine explosion at Boryslav, Russia (80 deaths), August 28. Treaty of Peace between San Salvador and Guatemala, August 28. Triple Alliance Treaty, between Germany, Austria, and Italy, extended to 1897, September 18. Elections in Brazil result in favor of the government, September 13. Disastrous floods in China (4,000,000 Chinese made homeless), September 17. Turkish man-of-war, *Ertogroul*, founders at sea (500 persons drowned), September 19. Moorish rebels defeated by Sultan's forces at Al Shokhman, September 25. King William II. of Prussia, 1. The McKelvie Tariff Bill signed by the President, October 2. Centennial celebration of the introduction of cotton manufacture in United States, held at Pawtucket, R. I., September 29 to October 3. Treaty between Germany and Zanzibar signed, October 5. Mormon Conference at Salt Lake City sustained President's action declaring the abolition of polygamy, October 6. United States Supreme Court Justice Samuel F. Miller died, October 13. Serious election disorders in Swiss canton of Ticino, October 27-28. Elections in Brazil sustain the new government by large majorities, October. Elections held in United States resulted in large gains by Democrats, November 4. British protectorate over Zanzibar proclaimed, November 7. King William II. of Holland died and was succeeded by his daughter, 10 years old, November 23. Congress reassembled, December 1. Sioux Indian war breaks out, December 15. A new congressional apportionment bill based on the census of 1890, passed the House, December 17. Henry B. Brown, of Michigan, appointed Justice of United States Supreme Court, in place of Justice Miller deceased, December 23.

1891.—German government takes possession of territory on coast of Zanzibar, January 1. Gen. Miles takes command of troops at seat of Sioux Indian War, January 2. In Caroline Islands over 800 foreigners killed and houses of missionaries destroyed at Pomati, January 7. Difficulties with Sioux Indians adjusted, January 15. Civil insurrection breaks out and ports of Valparaiso and other important towns blockaded by the rebels, January 15. George Bancroft, the historian, dies in Washington, January 17. Brazilian ministry resigned, January 22. Hon. William Windom, Secretary of the Treasury, died suddenly in New York city January 29. At Oporto, Portugal, garrison mutinied and government, but were suppressed, January 31. Spanish elections under now universal suffrage law favorable to government, February 2. Italian ministry under Signor Crispi resigned, succeeded by a new cabinet, headed by Rudini, February 9. Swiss government gives notice of terminating commercial treaty with Italy, February 10. Admiral D. D. Porter dies in Washington, February 13. Egyptian ministry resigned, Feb-

ruary 13. Gen. Sherman dies, February 14. Spanish force repulsed in Caroline Islands, February 17. American Loan and Trust Company suspends, February 18. Dr. Alexander Winchell, of Michigan University dies, February 19. Dilson and O'Brien transferred to Galway Jail, February 19. Disestablishment in Wales rejected by English Parliament by a vote of 235 to 202, February 20. Osman Digma's forces defeated by Egypt, February 21. Disastrous floods in Arizona, February 22. Admiral Alvarez, Commander of the Spanish navy, dies, February 22. Empress Frederick visits Paris, February 22. Great floods along the Ohio river, February 23. Norwegian cabinet resigns February 23. Brazilian Assembly adopts the proposed constitution, February 24. Women's Triennial Council at Washington, D. C., February 25. United States Congress passes agricultural appropriation bill, February 25. Gen. da Fonseca elected president of Brazil, February 25. Woman's National Suffrage Association meets in Washington, February 26. New York Merchants present testimonial of appreciation to Secretary Blaine, February 27. Great floods at Yuma, Arizona, February 27. Roumanian minister resigns, February 27. Empress Frederick leaves Paris, February 27. New cabinet elected at Honolulu, February 28. United States Congress passes subsidy bill; also postoffice bill, March 2. Free fight between Irish factions in Ireland, March 3. United States Congress adjourns, March 4. The Czechs victorious in Bohemia, March 5. Canadian elections carried by Conservatives by reduced majorities, March 6. Financial panic in Buenos Ayres, March 6. German victory in Zanzibar, March 6. United States Secretary of War decides to enlist 2,000 Indians as soldiers, March 7. King Alexander I. of Servia, officially proclaimed king, March 7. Parnell collection delegates start for America, March 8. Bishop Paddock, of P. E. diocese of Massachusetts, dies March 9. Severe blizzard prevails in England, March 9. Heaviest snow-storm of century in Great Britain, March 9. Canadian Parliament announced to meet April 29, March 11. French garrison in Tonquin overcome by natives, March 12. Italians arrested for killing chief Hennessy, after acquittal by jury, are assassinated in New Orleans, March 14. Judge John R. Brady, of New York Supreme Court, dies, March 16. British steamer *Roxburgh* Grade sinks off Scilly Islands, off Scilly Islands, March 16. Prince Jerome Napoleon dies at Rome, March 17. First telephonic communication between London and Paris, March 17. Tippoo Tib, famous African chief, stricken with paralysis, March 18. Gen. Joseph E. Johnston, ex-Confederate general, dies March 21. Insurgents make great progress in Chili, March 22. New York legislature refuses to submit prohibition amendment to the vote of the people by party vote of 62 to 45, March 23. Queen Victoria visits Grasse, France, March 23. Governor of Belanona, Madagascar, and his brother executed for the massacre of 278 persons, March 24. Protocols exchanged delimiting the British and Italian boundaries in Africa, March 24. Minnesota State Prison burned (lost \$90,000), March 25. England and Spain accept invitation to participate in World's Fair, March 25. New York legislature passes Zoological Garden and Bronx Botanical Bill, March 26. New Hampshire House kills local option license bill, March 26. Bulgarian Minister of Finance shot in Sofia, March 27. Russian troops reported massing on the Austrian and German frontiers, March 27. Dr. Howard Crosby dies in New York city, March 29. Irish factions in collision at Sligo, Ireland, March 29. Belgian police arrest three anarchists with 500 lbs. of dynamite in their possession, March 29. Phineas Taylor Barnum dies at Bridgeport, Conn., April 7.

CHURCH. See Britannica, Vol. V, pp. 758-60.

CHURCH, PHARCELLUS, Baptist clergyman, born in Seneca, N. Y., Aug. 11, 1801, died in Tarrytown, N. Y., June 5, 1886. He graduated in 1824 at Madison University (now Colgate), and after being ordained to the ministry, held pastorates in Providence, R. I., New Orleans, La., Boston and elsewhere. In 1854 he was editor of the "New York Chronicle," and from 1865 to 1886 one of the proprietors of the "Examiner." He was editorially connected with the "Watchman and Reflector." In 1846 Dr. Church was a delegate to the evangelical alliance meeting in London. He published many sermons, addresses and religious books, and he was connected with the founding of Rochester University.

CHURCH, FREDERIC EDWIN, painter, born in Hartford, Conn., May 4, 1826, became a pupil of Thomas Cole at Catskill, N. Y., and opened a studio in New York city in 1849. In South America, the West Indies, Mexico, Europe and the Holy Land, he has collected artistic material, but is best known by his picture of the *Falls of Niagara*, as seen from the Canadian side. Among his other paintings are: *The Heart of the Andes*; *Sunrise on Mt. Desert*; *Jerusalem*; *The Parthenon*; and *The Monastery*.

**CHURCH, RICHARD WILLIAM**, born in 1815, died Dec. 9, 1890. He spent a great part of his youth in Italy and elsewhere on the Continent; took a first-class at Oxford in 1836, and soon after was elected to a Fellowship at Oriel. From 1853 he held the rectory of Whatley, near Frome. In 1854 he published *Essays and Reviews*, and thereby took rank almost at once as one of the most graceful and scholarly writers of the day. His University sermons (1876-78), in a volume entitled *Human Life and Its Conditions* (1878), the series of St. Paul's and Oxford sermons in *The Gifts of Civilization* (1880), and the five St. Paul's sermons forming *The Discipline of the Christian Character* (1885), are profound contributions to religious thought. Other works are his *Life of St. Anselm* (1871), an amplification of two essays in his first volume; *The Beginning of the Middle Ages* (1877), an introduction to the series of *Epochs of Modern History*; *Dante; An Essay*; *Spenser* (1879), and *Bacon* (1879), two of the best books in the series of *English Men of Letters*.

**CHURCH, SANFORD ELIAS**, jurist, born in Milford, Otsego county, N. Y., April 18, 1815, died in Albion, N. Y., May 14, 1880. He became a lawyer and settled in Albion, whence he was called to the assembly in 1842. He was district-attorney (1846-47); lieutenant-governor from 1851 to 1855; comptroller of the State (1868-69), and member of the State constitutional convention in 1867. In 1870 he was elected chief justice of the court of appeals of the State of New York and held the office until his death. He was an influential politician of the Democratic party, and was respected for his uprightness and conservatism.

**CHURCH-ALE**, an ale brewed especially for use at church festivals; also a church festival at which this ale was served. These festivals were convivial meetings, usually held on Easter Sunday or during Whitsuntide. Two persons were chosen beforehand to preside over the feast and divide the victuals and drink voluntarily contributed by the parishioners. Sometimes the drink which had been brewed from malt given by the parishioners was sold about Whitsunday for the payment of church expenses. The church-ale was one of the old English institutions denounced by the Puritans.

**CHURCHILL, LORD RANDOLPH HENRY SPENCER**, an English statesman, third son of the seventh duke of Malborough, born Feb. 13, 1849, and educated at Eton and Merton College, Oxford. Lord Randolph entered Parliament in 1874; but it was not until after the general election of 1880 that he became prominent in politics, when he appeared as the leader of a band of Conservatives known as the "Fourth Party." Though a Conservative by tradition, he had a mind of his own, and in the period of Conservative depression that followed Disraeli's death he was frequently in collision with the nominal leaders of his party on questions of party organization and the conduct of the Opposition; but his vigorous attacks on Mr. Gladstone's policy, both foreign and domestic, were of unquestionable value to the Conservative cause; and upon Mr. Gladstone's defeat (1885) Lord Randolph was rewarded with the Secretaryship for India in Lord Salisbury's first ministry. From July to December, 1886, he was Chancellor of the Exchequer and leader of the House of Commons, a position which he soon relinquished. His attacks on the spending departments thenceforward were most incisive; but on most other points he spoke and voted steadily on the Conservative side. Lord Randolph Churchill is brilliant, versatile, erratic, and, though now (1891) in comparative retirement, no one can predict his future. His wife, Lady

Randolph Churchill, of American birth, daughter of Léonard Jerome, has given most valuable assistance to her husband in his electoral contests, and is a prominent member of the Primrose League.

**CHURCHILL RIVER**, of Canada, rises between the north branch of the Saskatchewan and the Athabasca, under 55° north latitude, and flows generally northeast through a series of lakes, first as the Beaver, then as the Missinippi, and finally as the Churchill or English River, to Hudson Bay, which it enters near Fort Churchill, after a course of nearly 1,000 miles. It is extensively navigated by canoes which are conveyed by portage past the largest of the many rapids.

**CHURCHING OF WOMEN**, a religious usage, prevailing in the Christian church from an early period, of women, on their recovery after child-bearing, going to church to give thanks. It appears to have been borrowed from the Jewish law (Leo XII, 6), and the earliest express mention of it is in the pseudo-Nicene Arabic canons.

**CHURCH OF GOD**. See **RELIGIOUS DENOMINATIONS IN THE UNITED STATES**, in these Revisions and Additions.

**CHURCH-RATES**, in England, a tax or assessment laid on the parishioners and occupiers of land within a parish, by a majority of their own body in vestry assembled, for the purpose of upholding and repairing the fabric of the church and the belfry, the bells, seats and ornaments the churchyard fence and the expenses (other than those of maintaining the minister) incident to the celebration of divine service.

**CHURNS**, machines used for the production of butter from cream or from whole milk. By agitation the butter globules are thrown against each other, until, after a period which varies in length with the quality of the butter-fat, the temperature and the condition of "ripeness," or incipient acidity of the cream. Churns are of great variety in form and dimensions, from the ladies' glass hand-churn, producing a few ounces of butter at a time, to one driven by water, steam or horse-power and churning the whole milk of a dairy at one operation.

**CHUTNEY**, an East Indian condiment, very largely used in India, and to a considerable extent in Britain. Indian Chutney is a compound of mangoes, chillies or capsicum and lime-juice, with some portion of other native fruits, such as tamarinds, etc., the flavor being heightened by garlic.

**GIALDINI, ENRICO**, Italian soldier, born at Castelvetro, Modena, Aug. 10, 1811. He studied at Parma, but by his share in the abortive insurrection of 1831 was forced to escape to France. In 1835, passing over to the Spanish service, he fought against the Carlists, and was made colonel. When Charles Albert headed the Italian rising in 1848 he hurried to Italy, and in the struggle which ensued fell into the hands of the Austrians. On his release he was employed by the Sardinian government, and fought in the brief campaign of 1849. In the Crimea he commanded a division of the Sardinian contingent. Created Duke of Gaeta, and for a few months governor of Naples, he had to act against Garibaldi in the second Sicilian expedition (1862). In 1864 he became a senator, and in the war of 1866 occupied Venice. In 1876 he was sent as ambassador to Paris, but retired in 1881, and received the post of one of the two generals of the army. He died in 1891.

**CIBRARIO, LUIGI**, an Italian historian, born in Turin in 1802, died in 1870. He was minister of public instruction in 1852, and minister of foreign affairs in 1855. He wrote important works on the history of Turin, and of the monarchy of Savoy, and on the political economy of the Middle Ages.



CICADA, a large genus of hemipterous insects, typical of the sub-order *Homoptera*, with uniform wings. They are well known for the noise made by the males, and for the "manna" or sap which their incisions cause to exude from trees. Specially abundant in warm countries, some eighteen species of cicada occur in the vine-bearing regions of Europe. Some large South American species are said to chirp "loud enough to be heard at the distance of a mile." The noise is caused by the vibrations of membranes at the openings of two respiratory tubes (tracheæ) on the last joint of the thorax, and the volume of sound is increased by two complex resonating cavities a little farther back. The apparatus is rudimentary in the females. *C. septemdecim* is the North American "seventeen years' locust," or "harvest fly," said to occur in special abundance every seventeen years, though they probably appear in some parts of the country every year. The males of the species perform the act of reproduction and soon die, probably taking no nourishment in the perfect state. The females deposit about 500 eggs in the twigs of trees, and die immediately after. The larvæ drop and bore their way into the ground, where they are supposed to remain for seventeen years, sucking the juices of the roots of trees and plants. When the pupæ emerge, the ground sometimes seems honeycombed by their numbers. The family to which cicadas belong is often known as that of the *stridulent* insects, and includes about five hundred species. An even larger closely allied family is that of the *Cicadellidæ*, including the common cuckoo spit. The name cicada has sometimes been applied to another hemipterous insect, a common bug named *Halticus pallicornis*, or *C. aptera* of Linnaeus.

CICATRIZATION (Lat., *cicatrix*, "a scar"), the process of healing or skinning over of an ulcer or broken surface in the skin or in a mucous membrane, by which a fibrous material of a dense resisting character, covered by a protecting layer of epithelium, is substituted for the lost texture. The new tissue in such a case is called the cicatrix, and usually resembles to a considerable extent the structure which it replaces; it is, however, less elastic, and from its shrinking in volume may produce an appearance of puckering.

CICERONE (from Cicero, "the orator," or "speaker"), a name given by the Italians to the guides who show travelers the antiquities of the country; hence, in general application, a guide; one who explains interesting features or curiosities.

CICINDELLA, a genus of beetles in the section *Pentamera*, and type of a family with some 300 species. They are very active, and occur abundantly on sandy places.

CICISBEO, a professed gallant who waits with fantastic devotion upon a married lady. In the higher ranks of Italian society, it was at one time considered unfashionable for the husband to associate with his wife anywhere except in his own house; and in society, or at public places of amusement, the wife was accompanied by her cicisbeo.

CIDARIS, a genus of sea urchins, and type of a family (*Cidaridæ*) with very long spines. The most of the members of the family are fossil forms, but over a score of living species are known.

CIEZA, a town of Spain, 26 miles northwest of Murcia. Population, 10,910.

CIGAR. See Britannica, Vol. V, pp. 775-76.

CILIA, "eyelashes" hair-like lashes borne by cells. They are mobile modifications of the living matter of the cell, and exhibit alternate bending and straightening. In many cases normal, patho-

logical and artificial cilia may sink down into less motile amoeboid processes.

CIMARRON, a beautiful interior village of New Mexico, former county-seat of Colfax county, situated near a range of lofty mountains, about 65 miles south of El Moro.

CINCHONA. See Britannica, Vol. V, pp. 780-82. CINCINNATI, a city of Ohio, county-seat of Hamilton county, and the metropolis of the State (see Britannica, Vol. V, pp. 782-84). The city is specially noteworthy for the elegance of its private residences and public edifices. Among the latter are the county court-house, the post-office and United States government building; the Cincinnati Hospital, Pike's Opera House, Chamber of Commerce building, Masonic Temple, Art School and Museum of Art, and numerous beautiful church edifices and charitable institutions. The frequency with which expositions have been held in Cincinnati during the last twenty years has given it the title of the Exposition City of the West. The most important of these was the Centennial Exposition, held in 1888 to celebrate the one hundredth anniversary of several important events, among them the settlement of Ohio. The exposition opened on July 4, and continued for one hundred days. The buildings for the various exhibits covered about twenty-three acres of ground. The central position of Cincinnati in relation to extensive producing regions and to leading channels of commerce, renders it one of the most important commercial cities of the Mississippi Valley. Its manufactures are of a widely diversified character, the more important being iron and leather goods. The population, which in 1880 was 255,708, has increased to 296,309 in 1890.

CINCINNATI GROUP, in American geology, an important group of rocks, belonging to the Lower Silurian series, particularly well developed near Cincinnati. The rocks of this series are rich in fossil remains, and some of the shales contain a large proportion of bituminous matter. Also called *Hudson River Group*.

CINCINNATI, ORDER OF THE, a society in the United States of North America, established by the officers of the Revolutionary Army in 1783, "to perpetuate their friendship, and to raise a fund for relieving the widows and orphans of those who had fallen during the war." It was so named because it included patriots, who, in many instances, had, like Cincinnati, left rural affairs to serve their country, and were resolved to return to their citizenship and its peaceful pursuits. The badge of the society consists of a bald eagle of gold suspended by a dark-blue ribbon with white borders, symbolizing the union of France and America. On the breast of the eagle there is a figure of Cincinnati receiving the military ensigns from the senators, in the background his cottage; near it a plow and instruments of husbandry, and round the whole are the words, *Omnia reliquit servare rempublicam*. As this distinction was made hereditary, it was attacked as opposed to republican equality, and at a meeting held in Philadelphia in 1784 several changes were made in the constitution of the society, the right of succession being made conditional on approval in each case by the society. After 1804 the branches in several of the States were abolished. There are still, however, several State societies.

CINDER-BED, a name given by the quarrymen to a stratum of the Middle Purbeck series of the Jurassic system, almost entirely composed of the loosely aggregated shells of a small oyster.

CINNAMIC ACID,  $C_9H_7CH=CHCOOH$ , exists in the free state in the balsams of Tolu and

Peru, in liquid storax, and in gum benzoin. Cinnamic acid forms colorless crystals readily soluble in alcohol, ether, and boiling water, but sparingly soluble in cold water. It is not of any importance in the arts, and is chiefly interesting as being the acid corresponding to oil of cinnamon. Although isomeric with oil of cassia, it has a slightly different flavor. Both of these oils are employed in medicine as aromatic stimulants, but chiefly as pleasant adjuncts to disguise the taste of nauseous drugs.

CINQUE, chief of the Mendi Africans, born at Caw-Mendi, about 1800. In 1839 this chief and a large company of his tribe were stolen from Africa and shipped to Havana, Cuba, being there purchased by Montes and Ruiz. The Africans were transferred to another ship, and were on their way to a southern port of Cuba when Cinque organized a revolt, overcame the crew and put them and the passengers on shore, then directed the two Spaniards to take them to Africa. By night the vessel was steered northward and finally arrived at Montauk Point, L. I. The Africans were put ashore at Farmington, Conn., and benevolent people instituted a trial for their release. The case was tried in the U. S. district court of the State, and after prolonged investigations the Africans were declared born free, and not amenable to punishment for the revolt on board ship. They were returned to their native land at public expense, and a mission was there established which is still maintained.

CINQUEFOIL, a common bearing in heraldry, representing a flower with five petals borne full-faced and without a stalk. If pierced—that is, perforated in the center—it should be so blazoned. Cinquefoil in architecture is an ornamental foliation in five compartments, used in the tracery of windows, panels, and the like. The cinquefoil is often represented in a circular form, the spaces between points or cusps representing the five leaves.

CIOTAT, LA, a town in the French department of Bouches-du-Rhône, on a bay in the Mediterranean, twenty-three miles southeast of Marseilles. It has a commodious harbor, the extensive workshops of the *Messageries Maritimes Company*, and a great coral fishery. Population, 8,901.

CIRCÆA, a small and widely distributed genus of Onagraceous herbs. *C. lutetiana*, frequent in shady situations, bears the name of Enchanter's Nightshade, and in Germany of Hexenkraut (Witches' Herb).

CIRCIANS, a name given in its wider sense to all the formerly independent tribes of the Caucasus; in a narrower sense it denotes the tribes inhabiting the northwestern wing of the Caucasus, with a government half patriarchal and feudal, and half constitutional. In 1858-65, rather than submit to Russian government, nearly the whole nation of fifteen tribes, to the number of nearly half a million persons, left their country for the Turkish possessions in Asia Minor, or the mountainous parts of Bulgaria, carrying with them their insubordinate spirit and marauding habits, which added to the horrors of the Bulgarian massacres of 1876-77. The Circassian nobles are principally Mohammedans, while the great mass of the people profess a corrupt Christianity, which shows strange survivals of earlier heathenism in its sacrifices and sacred trees, joined to the celebration of Easter, the sign of the Cross, and processions with lights. The Circassians are proverbially handsome, and for generations their daughters have adorned the harems of the wealthy Turks. They are also strong, active, brave and temperate. They are chiefly known through their long struggles to

maintain their independence against the aggression of Russia.

CIRCLE, MAGIC, a space in which sorcerers were wont to protect themselves from the fury of the evil spirits they had raised. This circle was usually described at midnight in certain conditions of moon and weather, on a piece of ground about nine feet square. Inside the outer circle was another somewhat less, in the center of which the sorcerer had his seat. The spaces between the circles, as well as between the parallel lines which inclosed the larger one, were filled "with all the holy names of God," and a variety of other characters supposed to be potent against the powers of evil.

CIRCLVILLE, a flourishing railroad city and county-seat of Pickaway county, Ohio. It is on the Scioto River and Ohio Canal. The city is built on ancient earthworks, which are in the form of a circle and a square. Pork-packing and broom-making are two leading industries. Pop. in 1890, 6,556.

CIRCULAR NOTES, bank-notes issued by foreign bankers for the special use of travelers, corresponding to the letters of credit issued by American bankers.

CIRCULAR NUMBERS, numbers whose powers end in the same figure as the numbers themselves: as those ending in 0, 1, 5, 6.

CIRCULATION. See under PHYSIOLOGY, Britannica, Vol. XIX, pp. 8-64.

CIRCUMCISION, FEAST OF, a festival in honor of Christ's circumcision, observed on Jan. 1st in the Roman church since about A. D. 487, and in the Anglican since 1549.

CIRCUMFERENCE, or PERIPHERY, the curve which incloses a circle, ellipse, oval, cardioid, or other plane figure. In figures bounded by straight lines, as the triangle, square, and polygon, the term *perimeter* is employed to designate the sum of all the bounding lines taken together.

CIRCUMNAVIGATION, the term usually applied to the act of sailing round the world, its literal meaning being simply "a sailing round."

CIRCVALLATION, LINES OF, the chain of works surrounding an army engaged in besieging a fortress, facing outward towards the country so as to guard against all attempts at relief by a field army. Redoubts, either isolated or connected by a line of parapet, were much used for this purpose in the sieges of the ancient and Middle Ages.

CIRCUS. See Britannica, Vols. V, p. 791; X, p. 65; XX, p. 829. The modern circus is chiefly an exhibition of feats of horsemanship and acrobatic displays, often combined with a menagerie, or collection of wild beasts. Astley was the most famous of English circus-managers; the Paris hippodrome is justly celebrated; but probably the most important circus ever organized is that of Barnum and Bailey's "Greatest Show on Earth" which includes a whole army of performers, "mid-air artists," and male and female equestrians.

CIRRIPEDIA, or CIRRHIPEDIA, a degenerated sub-class of crustacea, including the numerous forms of barnacles and acorn-shells. *Cirrhopoda* was a form of the name once commonly in use.

CIRRHOISIS: in pathology, a chronic inflammation of the liver, so called because of the yellow appearance of the organ when in this condition. The term is sometimes applied to a similar affection of other organs.

CIRRHUS, CIRRHUS, or TENDRIL: in botany, a leaf altered into a slender spiral, which by twisting around such objects as it comes in contact with attaches the plant to them, and enables it to climb. The term is also employed in zoölogy to designate any curled filament, and has been applied to the curiously modified feet of the *Cirripedia*.



CIRTA, the capital of ancient Numidia, now Constantine.

CIS, a Latin preposition meaning "on this side," it is often prefixed to names of rivers and mountains; as Cisalpine, "on this side of the Alps."

CISALPINE REPUBLIC. After the battle of Lodi, in 1796, Bonaparte organized two states, one on the south of the Po, the Cispadane Republic, and one on the north, the Transpadane. In 1797 these two were united into one under the title of the Cisalpine Republic, which embraced Lombardy, Mantua, Bergamo, Brescia, Cremona, Verona, and Rovigo, the duchy of Modena, the principalities of Massa and Carrara, and the three legations of Bologna, Ferrara, and the Romagna. The republic was dissolved for a time in 1799 by the victories of the Russians and Austrians, but was restored by Bonaparte after the victory of Marengo, with some modifications of constitution and increase of territory. In 1802 it took the name of the Italian Republic, and chose Bonaparte for its president. In 1805 a deputation from the republic conferred on

the Emperor Napoleon the title of King of Italy, after which it formed the kingdom of Italy till 1814.

CISTERN. See Britannica, Vol. IV, p. 503; Vol. XXI, pp. 714 et seq.

CISTUS, or Rock-Rose, a genus of exogenous plants giving its name to the natural order *Cistaceae*, which contains about 200 known species, chiefly natives of the South of Europe and the North of Africa. Some of them are beautiful evergreen shrubs. From *Cistus Creticus*, *Cistus ladaniferus*, and other species, gum ladanum is obtained.

CITADEL, a fort of four or five bastions in or near a town. It serves two purposes: it enables the garrison of a town to keep the inhabitants in subjection; and in case of a siege, it forms a place of retreat for the defenders.

CITATION, the act of calling a party into court to answer to an action, to give evidence, or to perform some other judicial act.

CITHARA, an ancient instrument closely resembling the guitar. See Britannica, Vol. XV, p. 114.

CITIES OF THE UNITED STATES. The following is a list of the cities of the United States having a population of 10,000 or over in 1890, as shown by the census of that year:

|                          |           |
|--------------------------|-----------|
| Akron, Ohio.....         | 27,702    |
| Albany, N. Y.....        | 93,523    |
| Alexandria, Va.....      | 14,318    |
| Allegheny, Pa.....       | 104,967   |
| Allentown, Pa.....       | 25,183    |
| Alpena, Mich.....        | 11,228    |
| Alton, Ill.....          | 10,184    |
| Altoona, Pa.....         | 30,209    |
| Amsterdam, N. Y.....     | 17,224    |
| Anderson, Ind.....       | 10,759    |
| Appleton, Wis.....       | 11,825    |
| Asheville, N. C.....     | 10,433    |
| Atchison, Kan.....       | 14,222    |
| Atlanta, Ga.....         | 65,514    |
| Atlantic City, N. J..... | 13,038    |
| Auburn, Me.....          | 11,228    |
| Auburn, N. Y.....        | 25,887    |
| Augusta, Ga.....         | 33,150    |
| Augusta, Me.....         | 10,521    |
| Aurora, Ill.....         | 19,634    |
| Austin, Tex.....         | 15,324    |
| Baltimore, Md.....       | 435,547   |
| Bangor, Me.....          | 14,040    |
| Baton Rouge, La.....     | 10,397    |
| Battle Creek, Mich.....  | 13,090    |
| Bay City, Mich.....      | 27,826    |
| Bayonne, N. J.....       | 18,996    |
| Beatrice, Neb.....       | 13,921    |
| Belleville, Ill.....     | 15,460    |
| Beverly, Mass.....       | 10,821    |
| Biddeford, Me.....       | 14,418    |
| Binghamton, N. Y.....    | 35,093    |
| Birmingham, Ala.....     | 26,241    |
| Bloomington, Ill.....    | 22,242    |
| Boston, Mass.....        | 445,477   |
| Bradford, Pa.....        | 10,478    |
| Bridgeport, Conn.....    | 48,656    |
| Bridgeton, N. J.....     | 11,471    |
| Brooklyn, Mass.....      | 27,294    |
| Brookline, Mass.....     | 13,572    |
| Brooklyn, N. Y.....      | 804,877   |
| Buffalo, N. Y.....       | 254,167   |
| Burlington, Iowa.....    | 29,528    |
| Burlington, Vt.....      | 14,566    |
| Butte City, Mont.....    | 10,701    |
| Cairo, Ill.....          | 10,944    |
| Cambridge, Mass.....     | 70,028    |
| Camden, N. J.....        | 58,274    |
| Canton, Ohio.....        | 26,327    |
| Carbondale, Pa.....      | 10,826    |
| Cedar Rapids, Iowa.....  | 17,997    |
| Charleston, S. C.....    | 54,592    |
| Charlotte, N. C.....     | 11,555    |
| Chattanooga, Tenn.....   | 29,113    |
| Chelsea, Mass.....       | 27,909    |
| Chester, Pa.....         | 20,167    |
| Cheyenne, Wyo.....       | 11,693    |
| Chicago, Ill.....        | 1,098,576 |
| Chicope, Mass.....       | 14,050    |

|                            |         |
|----------------------------|---------|
| Chillicothe, Ohio.....     | 11,256  |
| Cincinnati, Ohio.....      | 296,309 |
| Cleveland, Ohio.....       | 261,546 |
| Clinton, Iowa.....         | 13,629  |
| Clinton, Mass.....         | 10,424  |
| Cohoes, N. Y.....          | 26,493  |
| Columbia, Pa.....          | 10,507  |
| Columbia, S. C.....        | 14,508  |
| Columbus, Ga.....          | 18,650  |
| Columbus, Ohio.....        | 25,161  |
| Concord, N. H.....         | 90,398  |
| Council Bluffs, Iowa.....  | 17,604  |
| Covington, Ky.....         | 21,888  |
| Cumberland, Md.....        | 37,375  |
| Dallas, Texas.....         | 10,050  |
| Danbury, Conn.....         | 38,140  |
| Danville, Ill.....         | 19,385  |
| Danville, Va.....          | 11,528  |
| Davenport, Iowa.....       | 10,285  |
| Dayton, Ohio.....          | 58,868  |
| Decatur, Ill.....          | 16,841  |
| Denison, Texas.....        | 10,959  |
| Denver, Col.....           | 126,186 |
| Des Moines, Iowa.....      | 50,067  |
| Detroit, Mich.....         | 205,699 |
| Dover, N. H.....           | 12,790  |
| Dubuque, Iowa.....         | 30,147  |
| Duluth, Minn.....          | 32,725  |
| East Liverpool, Ohio.....  | 10,947  |
| Easton, Pa.....            | 14,185  |
| East Portland, Oregon..... | 10,481  |
| East St. Louis, Ill.....   | 16,156  |
| Eau Claire, Wis.....       | 17,438  |
| Elgin, Ill.....            | 17,429  |
| Elizabeth, N. J.....       | 37,683  |
| Elkhart, Ind.....          | 11,370  |
| Elmira, N. Y.....          | 28,070  |
| El Paso, Texas.....        | 10,148  |
| Erie, Pa.....              | 39,699  |
| Evansville, Ind.....       | 50,674  |
| Exeter, Mass.....          | 11,068  |
| Fall River, Mass.....      | 74,398  |
| Findlay, Ohio.....         | 18,674  |
| Fitchburg, Mass.....       | 23,067  |
| Flushing, N. Y.....        | 19,136  |
| Fond du Lac, Wis.....      | 11,442  |
| Fort Scott, Kan.....       | 11,837  |
| Fort Smith, Ark.....       | 11,291  |
| Fort Wayne, Ind.....       | 35,349  |
| Fort Worth, Texas.....     | 20,735  |
| Freeport, Ill.....         | 10,120  |
| Galesburg, Ill.....        | 15,212  |
| Galveston, Texas.....      | 29,118  |
| Glocester, Mass.....       | 21,651  |
| Gloversville, N. Y.....    | 15,796  |
| Grand Rapids, Mich.....    | 61,147  |
| Greenwich, Conn.....       | 10,120  |
| Hagerstown, Md.....        | 11,698  |
| Hamilton, Ohio.....        | 17,519  |
| Hanibal, Mo.....           | 12,816  |
| Harrisburg, Pa.....        | 40,164  |
| Hartford, Conn.....        | 55,182  |
| Hastings, Neb.....         | 19,738  |
| Haverhill, Mass.....       | 27,402  |
| Hazleton, Pa.....          | 11,818  |
| Helena, Mont.....          | 15,834  |

|                         |           |                         |           |
|-------------------------|-----------|-------------------------|-----------|
| Hempstead, N. Y.        | 23,517    | Norfolk, Va.            | 35,451    |
| Hoboken, N. J.          | 43,560    | Norristown, Pa.         | 19,750    |
| Holyoke, Mass.          | 35,637    | North Adams, Mass.      | 16,074    |
| Hornellsville, N. Y.    | 10,948    | Northampton, Mass.      | 14,990    |
| Houston, Texas.         | 27,411    | Norwalk, Conn.          | 17,789    |
| Hudson, N. Y.           | 10,027    | Norwich, Conn.          | 16,192    |
| Huntington, W. Va.      | 10,082    | Oakland, Cal.           | 48,590    |
| Hyde Park, Mass.        | 10,193    | Ogden, Utah.            | 14,919    |
| Indianapolis, Ind.      | 107,445   | Ogdensburg, N. Y.       | 11,677    |
| Ironton, Ohio.          | 10,922    | Oil City, Pa.           | 10,943    |
| Ishpeming, Mich.        | 11,134    | Omaha, Neb.             | 138,028   |
| Ithaca, N. Y.           | 11,557    | Orange, N. J.           | 18,774    |
| Jackson, Tenn.          | 10,022    | Oshkosh, Wis.           | 22,752    |
| Jackson City, Mich.     | 20,779    | Oswego, N. Y.           | 21,826    |
| Jacksonville, Fla.      | 17,160    | Ottumwa, Iowa.          | 13,996    |
| Jacksonville, Ill.      | 12,357    | Oyster Bay, N. Y.       | 13,798    |
| Jamaica, N. Y.          | 13,646    | Paducah, Ky.            | 13,024    |
| Jamestown, N. Y.        | 15,991    | Passaic, N. J.          | 13,027    |
| Janesville, Wis.        | 10,631    | Paterson, N. J.         | 78,558    |
| Jeffersonville, Ind.    | 11,274    | Pawtucket, R. I.        | 27,509    |
| Jersey City, N. J.      | 163,987   | Peabody, Mass.          | 10,158    |
| Johnstown, Pa.          | 21,129    | Peekskill, N. Y.        | 10,026    |
| Joliet, Ill.            | 27,407    | Pensacola, Fla.         | 11,751    |
| Kalamazoo, Mich.        | 17,857    | Peoria, Ill.            | 40,587    |
| Kansas City, Kan.       | 38,170    | Petersburgh, Va.        | 23,317    |
| Kansas City, Mo.        | 132,416   | Philadelphia, Pa.       | 1,044,894 |
| Keokuk, Iowa.           | 14,075    | Pittsburgh, Pa.         | 238,473   |
| Key West, Fla.          | 18,058    | Pittsfield, Mass.       | 17,281    |
| Kingston, N. Y.         | 21,181    | Pittston, Pa.           | 10,296    |
| Knoxville, Tenn.        | 22,447    | Plainfield, N. J.       | 11,350    |
| La Crosse, Wis.         | 25,053    | Port Huron, Mich.       | 13,519    |
| La Fayette, Ind.        | 16,407    | Portland, Me.           | 36,608    |
| Lancaster, Pa.          | 32,090    | Portland, Oregon.       | 47,294    |
| Lansing, Mich.          | 12,630    | Portsmouth, Ohio.       | 12,387    |
| Lansingburg, N. Y.      | 15,023    | Portsmouth, Va.         | 12,345    |
| Laredo, Texas.          | 11,313    | Pottstown, Pa.          | 13,201    |
| Lawrence, Mass.         | 44,654    | Pottsville, Pa.         | 14,194    |
| Leadville, Colo.        | 11,559    | Poughkeepsie, N. Y.     | 23,519    |
| Leavenworth, Kan.       | 20,250    | Providence, R. I.       | 132,099   |
| Lebanon, Pa.            | 14,737    | Pueblo, Cal.            | 28,128    |
| Lewiston, Me.           | 21,668    | Quincy, Ill.            | 31,478    |
| Lexington, Ky.          | 22,355    | Quincy, Mass.           | 16,723    |
| Lima, Ohio.             | 15,970    | Racine, Wis.            | 21,022    |
| Lincoln, Neb.           | 55,491    | Raleigh, N. C.          | 12,798    |
| Little Rock, Ark.       | 22,496    | Randolph, Pa.           | 38,936    |
| Lockport, N. Y.         | 76,003    | Richmond, Ind.          | 16,249    |
| Logansport, Ind.        | 13,798    | Richmond, Va.           | 80,838    |
| Long Island City, N. Y. | 30,396    | Rochester, N. Y.        | 138,727   |
| Los Angeles, Cal.       | 50,394    | Rockford, Ill.          | 23,589    |
| Louisville, Ky.         | 161,005   | Rock Island, Ill.       | 13,596    |
| Lowell, Mass.           | 77,696    | Rome, N. Y.             | 14,080    |
| Lynn, Mass.             | 19,779    | Sacramento, Cal.        | 26,779    |
| Mackeesport, Pa.        | 55,727    | Saginaw, Mich.          | 46,169    |
| Macon, Ga.              | 22,698    | St. Joseph, Mo.         | 52,811    |
| Madison, Wis.           | 13,392    | St. Louis, Mo.          | 450,245   |
| Mahoney, Pa.            | 11,291    | St. Paul, Minn.         | 133,156   |
| Malden, Mass.           | 23,021    | Salem, Mass.            | 30,801    |
| Manchester, N. H.       | 44,126    | Salt Lake City, Utah.   | 45,025    |
| Manistee, Mich.         | 12,799    | San Antonio, Texas.     | 38,681    |
| Mansfield, Ohio.        | 13,542    | San Diego, Cal.         | 16,158    |
| Marlborough, Mass.      | 13,805    | Sandusky, Ohio.         | 19,234    |
| Marinette, Wis.         | 11,513    | San Francisco, Cal.     | 297,990   |
| Massillon, Ohio.        | 10,068    | San José, Cal.          | 18,027    |
| Medford, Mass.          | 11,079    | Saratoga Springs, N. Y. | 13,124    |
| Memphis, Tenn.          | 64,586    | Savannah, Ga.           | 41,762    |
| Menominee, Mich.        | 10,606    | Scheuclady, N. Y.       | 19,857    |
| Meriden, Conn.          | 21,230    | Scranton, Pa.           | 83,450    |
| Meridian, Miss.         | 10,889    | Seattle, Wash.          | 43,914    |
| Michigan City, Ind.     | 10,704    | Sedalia, Mo.            | 13,994    |
| Middletown, N. Y.       | 11,918    | Shamokin, Pa.           | 14,339    |
| Milwaukee, Wis.         | 204,150   | Sheboygan, Wis.         | 16,341    |
| Minneapolis, Minn.      | 164,738   | Shenandoah, Pa.         | 13,445    |
| Mobile, Ala.            | 31,822    | St. Louis, Mo.          | 37,862    |
| Moline, Ill.            | 11,985    | Sioux Falls, S. D.      | 10,154    |
| Montgomery, Ala.        | 21,790    | Somerville, Mass.       | 40,152    |
| Muncie, Ind.            | 11,339    | South Bend, Ind.        | 21,786    |
| Muscatine, Iowa.        | 11,432    | South Bethlehem, Pa.    | 10,836    |
| Muskegon, Mich.         | 23,668    | Spokane Falls, Wash.    | 19,917    |
| Nanticoke, Pa.          | 10,047    | Springfield, Ill.       | 22,822    |
| Nashua, N. H.           | 19,311    | Springfield, Mass.      | 44,179    |
| Nashville, Tenn.        | 76,309    | Springfield, Mo.        | 21,842    |
| Nebraska City, Neb.     | 11,472    | Springfield, O.         | 32,135    |
| New Albany, Ind.        | 21,000    | Stamford, Conn.         | 15,685    |
| Newark, N. J.           | 181,518   | Steuenville, Ohio.      | 13,363    |
| Newark, Ohio.           | 14,361    | Stillwater, Minn.       | 11,320    |
| New Bedford, Mass.      | 40,383    | Stockton, Cal.          | 13,376    |
| New Brighton, N. Y.     | 16,400    | Syracuse, N. Y.         | 87,877    |
| New Britain, Conn.      | 19,010    | Tacoma, Wash.           | 35,858    |
| New Brunswick, N. J.    | 13,459    | Taunton, Mass.          | 25,448    |
| Newburgh, N. Y.         | 23,263    | Terre Haute, Ind.       | 30,287    |
| Newburyport, Mass.      | 13,947    | Tiffin, Ohio.           | 10,978    |
| New Castle, Pa.         | 11,581    | Toledo, Ohio.           | 52,632    |
| New Haven, Conn.        | 85,981    | Topeka, Kan.            | 31,800    |
| New London, Conn.       | 13,759    | Trenton, N. J.          | 58,438    |
| New Orleans, La.        | 241,995   | Troy, N. Y.             | 60,605    |
| Newport, Ky.            | 24,938    | Utica, N. Y.            | 44,001    |
| Newport, R. I.          | 19,449    | Vicksburg, Miss.        | 13,298    |
| Newton, Mass.           | 24,379    | Waco, Texas.            | 13,067    |
| Newton, N. Y.           | 17,537    | Waltham, Mass.          | 18,707    |
| New York, N. Y.         | 1,515,501 | Washington, D. C.       | 228,160   |
|                         |           | Waterbury, Conn.        | 28,591    |



|                      |        |
|----------------------|--------|
| Watertown, N. Y.     | 14,733 |
| West Bay City, Mich. | 12,910 |
| West Troy, N. Y.     | 12,942 |
| Weymouth, Mass.      | 10,866 |
| Wheeling, W. Va.     | 35,052 |
| Wichita, Kan.        | 23,735 |
| Wilkes Barre, Pa.    | 37,651 |
| Williamsport, Pa.    | 23,735 |
| Wilmington, Del.     | 27,107 |
| Wilmington, N. C.    | 61,437 |
| Windham, Conn.       | 20,013 |
| Winona, Minn.        | 10,025 |
| Woburn, Mass.        | 18,208 |
| Woonsocket, R. I.    | 13,499 |
| Worcester, Mass.     | 20,759 |
| Yonkers, N. Y.       | 81,655 |
| York, Pa.            | 31,945 |
| Youngstown, Ohio.    | 20,819 |
| Zanesville, Ohio.    | 33,199 |
|                      | 21,117 |

**CITIZEN** (Fr., *citoyen*; Lat., *civis*), a term applied either specifically to a dweller in a town, or to any one who is either born in the country or has become legally naturalized in it. From the point of view of American constitutional law, a citizen being a member of the political community to which he belongs, every person born in the United States and subject to its jurisdiction (except untaxed Indians) falls within the definition. An alien may become a citizen by being naturalized under the acts of Congress. A citizen of the United States residing in any State of the Union is a citizen of that State. There being a government in each of the several States, as well as a government of the United States, a person may be, and usually is, at the same time a citizen of both, but his rights as a citizen under one of these governments differ legally from those under the other. On the other hand, a person may be a citizen of the United States and not be a citizen of any particular State, having his residence in one of the Territories, or not having a fixed residence in any State. Citizenship is not confined to those who have a right to vote, as minors and women are usually citizens without those rights.

In France during the Revolution, the word citizen was adopted by the Republicans as the most appropriate term to express the principle of *liberté, égalité et fraternité*. It took the place of *Monsieur*. Every Frenchman became *citoyen* in relation to other Frenchmen, the highest in official station being so addressed by the lowest. The usage gradually died out after the assumption of imperial power by Napoleon.

**CITIZENSHIP IN THE UNITED STATES** embraces the following persons: (1) All individuals born in the United States and not subject to any foreign power (except untaxed Indians). This includes all children of alien parents other than those of foreign official representatives. (2) All children born elsewhere to fathers who were at the time of their birth citizens resident at some time in the United States. (3) All naturalized persons. (4) Women, though not born in the United States, nor naturalized (if not incapable of naturalization) who are married to citizens. (5) All Indians born within the United States, who have withdrawn from tribal relations, and who are enrolled as taxpayers, or who have accepted lands in severalty under the Congressional act of 1870.

A person may be a citizen of the United States without being a citizen of a particular State, and *vice versa*. The two citizenships are quite distinct in law. For citizenship in the States severally, see **NATURALIZATION OF ALIENS**.

A naturalized citizen is one of foreign birth who has become a citizen by adoption or naturalization. The conditions under and the manner in which an alien may be admitted to citizenship in the United States are prescribed by sections 2165-74 of the Revised Statutes of the United States. They sub-

stantially include the following: The alien must declare upon oath before a circuit or district court of the United States, or a district or supreme court of the Territories, or a court of record of any of the States having common-law jurisdiction, and a seal and clerk, two years at least prior to his admission, that it is his intention, *bona fide*, to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince or state, and particularly to the one of which he may at the time be subject. He must also declare on oath before one of the courts named "that he will support the Constitution of the United States, and that he absolutely and entirely renounces and abjures all allegiance and fidelity to every foreign prince, potentate, state or sovereignty, and particularly by name to the prince, potentate, state or sovereignty, of which he was before a citizen or subject," which proceedings must be recorded by the clerk of the court.

If it shall appear to the satisfaction of the court to which the alien has applied that the applicant has resided within the United States, continuously, for five years, and that during that time "he has behaved as a man of good moral character, attached to the principles of the Constitution of the United States, and well disposed to the good order and happiness of the same," he will be admitted to citizenship. If the applicant has borne any hereditary title or order of nobility he must make an express renunciation of it at the time of his application. Any alien twenty-one years old and upwards, who has been in the armies of the United States and has been honorably discharged therefrom, may become a citizen on his petition without any previous declaration of his intention, provided that he shall have resided in the United States at least one year previous to his application, and is of good moral character. Any alien under the age of twenty-one years, who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be admitted a citizen thereof, may, after he arrives at the age of twenty-one years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen; but he must make a declaration on oath and prove to the satisfaction of the court that for two years next preceding it has been his *bona fide* intention to become a citizen. The children of persons who now are or have been citizens of the United States are, though born out of the limits and jurisdiction of the United States, considered as citizens thereof. The naturalization of Chinese is expressly prohibited by section 14, chapter 126, Laws of 1882.

**CITRON-WOOD**, or **CITRUS-WOOD**, the most highly prized wood of Roman antiquity, derived from *Biota orientalis*, or from *Callitris quadrivalvis*, allied coniferous trees, natives of Africa and the Orient. It is a very beautiful wood, believed by the Turks to be imperishable, and much used by them for floors and ceilings of mosques.

**CITRUS**, a genus of the natural order *Aurantaceæ*, trees and shrubs of tropical, subtropical and warm temperate Asia, but many of them now cultivated in all similar climates for their fruit. To it belong the orange, citron, lemon, lime, bergamot, shaddock, etc.

**CITROSMIA**, a genus of trees of the natural order *Monimiaceæ*, of which the leaves abound in an oil resembling oil of citron. They are natives of the tropical parts of South America.

**CITTADELLA**, a town of Northern Italy, 14 miles northeast of Vicenza, situated on the Bren-

tella. It has manufactories of paper and woolen. Population, 8,505.

**CITY** (Fr., *cité*; Lat., *civitas*), an important town. In the United States a city is an incorporated town, usually governed by a mayor, aldermen and common council. In some States 10,000 inhabitants are requisite to the formation of a city government, while in the new States a less number is required, some having incorporated cities of fewer than 3,000 inhabitants. In several of the Western States cities are organized under a general law by which they are designated, according to the number of inhabitants, as cities of the first, second and third class. The term city, as used in Great Britain, is generally applied to all towns which are incorporated, and which either are or have been sees of bishops. In the case of towns which have grown greatly beyond their original dimensions it is not unusual to give the name of city to the space which they originally occupied—thus, we speak of the city of London in contradistinction to the metropolis, *la Cité* of Paris, and similarly of other places.

**CITY OF REFUGE.** The Jewish law set apart six cities, three on each side of the Jordan, as cities of refuge for the murderer. These cities were Bezer, Ramoth, and Golan on the east, and Hebron, Shechem, and Kadesh on the west.

**CITY POINT,** a port of entry situated at the confluence of the James and Appomattox Rivers, in Prince George county, Va. This place was made a supply depot by General Grant in his assaults on Petersburg and Richmond.

**CIUDAD RODRIGO,** a fortified town of Spain, 17 miles from the Portuguese frontier, and 56 south-west of Salamanca by rail, on a steep hill above the river Agueda, which is here crossed by a fine bridge. It is a poor, dirty town, chiefly of interest for its sieges during the Peninsular War.

**CIVICS** (Lat., *civis*, a citizen), a new word directly derived from the adjective civic, and introduced by Henry Randall Waite, Ph.D., F. A. S. A., who defined it as follows: "The body of knowledge or science which devotes itself to the consideration of citizenship relations, including the reciprocal relations of government and citizenship." Civics seeks to properly coordinate, as parts of an integral science, the essential truths with which the citizen must be familiar in order to the best use of his powers and privileges. It includes (1) *Ethics*: defined by E. Benjamin Andrews, D.D., LL.D., of the Faculty of the Institute as "The Doctrine of Duties in Society;" in other words, the study and setting forth of the conditions of human character which are essential to the welfare of the citizen, society and government. As right character is the natural source of right action, the science of civics first concerns itself with the facts which underlie and account for these essential characteristics of the good citizen. That the citizen may be qualified to act the part of an intelligent juror in all affairs submitted to the decision of the suffrage, it is essential that he be adequately informed as to other facts in Civics as follows: (2) *Civil Polity*—Governmental methods and machinery; suffrage rights and obligations; the qualifications and duties of public officials; executive, legislative, and judicial affairs, and all other matters having relation to the orderly and proper administration of government. (3) *Law*—The principles and facts of the law in applications most directly involving the interests of society, and especially of the citizen and the government. (4) *Economics*—The principles or laws which explain or control the production, distribution and ownership of that which constitutes, or is technically called wealth; the facts relating to the develop-

ment of natural resources, to manufactures, and to internal and foreign commerce; questions of supply and demand, labor and capital; and matters of like character, considered with reference to their effects upon the citizen, and in their relations to government. (5) *History*—Collateral facts illustrative of tendencies and results, growing out of given conditions, considered in connection with Ethics, Civil Politics, Law and Economics. *Civics* offers an opportunity for the exact differentiation of facts hitherto confused, as within the scope of two or more of the sciences which it includes, and for corresponding exactness in deductions. It differs from what is called social science in general, or sociology, in confining itself to the consideration of sociological facts in their bearings on affairs of citizenship and government.

**CIVICS, AMERICAN INSTITUTE OF,** a National Educational Institution, with a charter from the United States Government. Founded in 1885, by the late Chief Justice Morrison R. Waite and Justice William Strong, of the U. S. Supreme Court; Noah Porter, late President of Yale University; John Bigelow, Mellen Chamberlain, Theodore W. Dwight, John Jay, Ex-Governor Hugh S. Thompson, of South Carolina; General H. B. Carrington, U. S. A.; W. E. Sheldon, the late Dr. Alexander Winchell, Henry Randall Waite, Ph.D., General William Preston Johnston, of Louisiana; General Joseph R. Hawley, W. H. Du Puy, LL.D., Bishop J. H. Vincent, and other distinguished citizens. Assuming that the voter is a trustee charged with sacred responsibilities, the Institute aims to secure such attention to the facts of Civics on the part of all citizens as shall surround the suffrage with the safeguards which grow out of a proper sense of obligations, integrity of purpose, and an adequate degree of intelligence as to affairs in issue. The Institute is controlled by 33 Trustees, and has auxiliaries styled "Councils" in every State and Territory. The immediate direction of its affairs is intrusted to a President and Faculty now numbering 12 members. It has departments of work as follows: 1st, in connection with Common Schools; 2nd, Colleges and Professional Schools, A. B. Woodford, Ph.D., secretary; 3d, the Press, L. A. Maynard, secretary; 4th, Popular Work. Its Faculty has corresponding members in 152 colleges. Its Press Department, with the aid of leading newspapers, reaches more than a million readers weekly; its corps of lecturers, scattered throughout the land, numbers 45 distinguished speakers and writers. In connection with its Department of Popular Work, aided by Rev. J. M. Whiten, Ph.D., it seeks to promote its purposes through the co-operation of pulpit orators by suitable addresses on stated occasions intended to exalt the standard of citizenship. The Business Educators' Association of America, representing Business Schools with an attendance of more than 50,000 youth, has made itself an auxiliary of the Institute, with the purpose of carrying instructions in Civics into all business schools. The President of the Institute is Dr. H. R. Waite, and its offices are in New York city.

**CIVIL DAMAGE ACTS,** the name given to measures passed in several of the United States giving to persons who have sustained injury, in person or property or means of support, by any intoxicated person, in consequence of such intoxication, the right of action against the person who sold or gave away the liquor which caused such intoxication.

**CIVIL DEATH,** a term applied to one who is separated from civil society, or from the enjoyment of civil rights. In the United States one who has



been convicted of a felony and sentenced to imprisonment for life is said to be civilly dead.

**CIVILIAN**, a person whose pursuits are civil, that is, neither military nor naval; or one who is skilled in the civil law.

**CIVIL RIGHTS**, a term applied to the privileges which are accorded to every citizen by virtue of his citizenship, without regard to race, color, or previous condition of servitude. The condition of the colored race in the United States after the abolition of slavery led to the adoption of the 14th and 15th amendments to the Constitution, by which it is provided that "no State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States;" and that the "right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous condition of servitude." The words "privileges and immunities" have been held to mean such as are of a general nature, as security to life and liberty, the right to acquire property, to have access to courts of justice, and freedom to pursue and obtain happiness and safety, with such restrictions as are necessary to the public good. Whatever guarantees States accord to their own citizens upon these points must be extended to the citizens of other States. The effect of the 15th amendment to the Constitution in respect of many questions of right in the several States has not been settled by the courts, but the object of that amendment is well understood. It abrogates all State legislation or Constitutional provision creating distinctions among citizens of the United States based upon race and color, and prevents the introduction of such distinctions either by the action of the State or by the General Government.

**CIVIL RIGHTS ACT**, an act of the United States Congress, passed in 1875, forbidding the exclusion of any person from the enjoyment of inns, public conveyances, theaters, etc., on account of race or color.

**CIVIL RIGHTS BILL**, an act passed in 1866 by the United States Congress conferring citizenship upon all persons born in the United States, not subjects of other powers, "of every race and color, and without regard to any previous condition of servitude."

**CIVIL SERVICE AND CIVIL SERVICE REFORM**. Civil Service is the executive branch of the public service, as distinguished from the military and the naval. Under enlightened forms of government it is separated into three branches: Legislative, Judicial, and the Executive.

The Legislative branch is essentially representative, and this function of legislators makes their views and interests an important part of the proper test of fitness for the places they seek. But very different considerations should prevail in the selection of clerks and other subordinates, for the reason that secretaries, clerks, copyists, messengers, etc., are in no sense representative. They owe no duty to members of one party that they do not owe equally to the other. Their political views should under no circumstances enter into their work.

The Judicial branch of the Government is not representative. To make it so in any sense is a prostitution of judicial functions and a calamity. Justice should be administered alike to every one, at all times and places, without party fear or favor. In the Executive department of the United States there are more than 100,000 persons occupying responsible clerical positions above the grade of laborers; there are nearly 50,000 postmasters, with tens of thousands of subordinates, and in all the departments official life is graded from the central

authority down to the porters and doorkeepers. With rare exceptions they are doing work the success and the utility of which depend upon its being done wholly on business principles, without any bias of party views. Yet so great was the effort made by parties struggling for power to fill these places with their favorites for the sake of their patronage that gross abuses were practiced.

The same difficulties exist in a monarchical as in a republican form of government. Great Britain discovered the abuses fifty years ago, and required an examination of applicants. The first ones were called *pass* examinations, but rapidly grew into *competitive* examinations. The British precedent was the basis of an act, passed by the United States Congress in 1853, by which such examinations were made the basis of an appointment to any place in the four great classes of clerkships in Washington. These examinations were the first practical steps toward what is designated as Civil Service Reform. For more than thirty years Great Britain enforced competitive examinations for the selection of her administrative officials in British India. They proved successful, and in 1870 were insisted upon in the administration of the Home Government.

In 1872 and 1874 President Grant enforced the system in the departments at Washington. He appointed a Civil Service Commission to attend to the matter, and the result was that a superior mental power began to be felt in the executive part of the national work. The hostility of many members of Congress, who wanted their favorites in official positions, was encountered, and for a time was partially successful. Competitive examinations were, however, reestablished by President Hayes at the postoffice and custom-house in New York city, and continued there by Presidents Garfield and Arthur. In 1883 Congress passed an act containing stringent provisions for the suppression of political assessments, and also provided for a complete system of competitive examinations. Since July, 1883, these rules have been enforced not only in the national departments, but in various State and municipal governments.

**CIVIL SERVICE RULES**. President Grant in 1872 appointed a "commission" to "devise rules and regulations" for admission to, and continuance in, the civil service of the United States. The commission prepared and reported such rules, based upon competitive examinations, and the Government officers began at once to carry them out to some extent. But the political pressure brought to bear upon many of the Senators and Members of Congress by their constituents for place and promotion was such that the progress made in the proposed reform was much less rapid than had been expected. In 1879 President Hayes renewed the efforts of President Grant, and the reform was specially observed in the New York postoffice and some other large postoffices. Since that date considerable progress has been made, and the system of competitive examinations has been extended not only to the Federal offices but also to the civil service in several of the States and chief cities.

The act of Congress prescribing rules and the extent of their application was passed in 1883. It provides for the appointment by the President of three "Civil Service Commissioners," with a chief Examiner, a Secretary, and other employés; and makes it the duty of the Commission to aid the President in preparing rules for carrying the new act into effect; to make regulations for examinations, and for office records and reports, and to provide also for the enforcement of the act. The headquarters of the Commission is in Washington, D. C. The act prescribes that the rules shall apply

to the Executive Departments at Washington; the Department of Labor and the Civil Service Commission; the Customs districts in which there are fifty or more employés, eleven in number; the postoffices in which there are fifty or more employés, now forty-six; and the Railway Mail Service—including, altogether, about thirty-two thousand places.

The Classified Departmental Service embraces all places in the departments at Washington, excepting messengers, laborers, workmen, and watchmen (not including any person designated as a skilled laborer or workman), and no person so employed can, without examination under the rules, be assigned to clerical duty, and also excepting those appointed by the President, by and with the advice and consent of the Senate. The Classified Customs Service embraces the customs districts where the officials are as many as fifty, including the places giving \$900 a year, and all those giving a larger salary where the appointee is not subject to confirmation by the Senate. The Classified Postal Service embraces the post-offices where the officials are as many as fifty, including all places above the grade of a laborer.

For places in the Classified Service, where technical additional qualifications are needed, special examinations are held. In the Departmental Service they are held for the State Department, the Pension, Patent and Signal offices, Geological and Coast Surveys, and other offices.

Applicants for examination must be citizens of the United States of the proper age. No person habitually using intoxicating liquors can be appointed. No discrimination is made on account of sex, color, or political or religious opinions. The limitations of age are: For the Departmental Service, not under twenty years; in the Customs Service, not under twenty-one years, except clerks or messengers, who must not be under twenty years; in the Postal Service, not under eighteen years, except messengers, stampers, and other junior assistants, who must not be under sixteen or over forty-five years, and carriers, who must not be under twenty-one or over forty; and in the Railway Mail Service not under eighteen or over thirty-five years. The age limitations do not apply to any person honorably discharged from the military or naval service of the United States by reason of disability resulting from wounds or sickness incurred in the line of duty. Such persons are preferred under § 1754 R. S.

Every one seeking to be examined must first file an application blank. The blank for the Departmental or Railway Mail Service should be requested directly of the Civil Service Commission, at Washington. The blank for the Customs or Postal Service must be requested in writing by the persons desiring examination of the Customs or Postal Board of Examiners at the office where service is sought. These papers should be returned to the officers from whom they emanated.

The applicants to enter the services designated are examined as to their relative capacity and fitness. The clerk examination is used only in the Customs and Departmental Services for the copyists of \$1,000 and upward, requiring peculiar information or skill. It is limited to the following subjects: First, orthography, penmanship, and copying; second, arithmetic—fundamental rules, fractions, and percentage; third, interest, discount, and elements of book-keeping and of accounts; fourth, elements of the English language, letter-writing, and the proper construction of sentences; fifth, elements of the geography, history, and government of the United States. For places in which a lower degree of education suffices, as for employes in postoffices and those below the grade of clerks in custom-houses and in the departments at Washington, the Commission limits the examination to less than these five subjects, omitting the third and parts of the fourth and fifth subjects; and this is known as the copyist examination. No one is qualified for appointment whose standing upon a just grading in the clerk or copyist examination is less than 70 per centum of complete proficiency, except that applicants claiming military or naval preference under § 1754 R. S. need obtain but sixty-five.

The law also prescribes competitive examinations to test the fitness of persons in the service, for promotion therein. Persons passing an examination are graded and registered. The Commission gives a certificate to the person stating whether he passed or failed to pass.

When there is a vacancy to be filled the appointing officer applies to the Commission or proper examining board, and it reports to him the names of the three persons graded highest on the proper register of those in his branch of the service and remaining eligible, and from the said three a selection must be made.

Every appointment is made for a probationary period of six months, at the end of which time, if the conduct and capacity of the person appointed have been found satisfactory, the appointment is made absolute.

The following are excepted from examination for appointment: Confidential clerks of heads of departments or offices; cashiers of collectors and postmasters, superintendents of money-order divisions in postoffices, custodians of money for whose fidelity another officer is under bond, disbursing officers who give bonds, persons in the secret service, deputy collectors and superintendents and chiefs of divisions or bureaus, and a few others.

CIVITA SAN-ANGELO, a town of South Italy in the province of Teramo, near the Adriatic. It has a population of 6,578, and a trade in grain, wine and oil.

CIVITELLA DEL TRONTO, a town of South Italy in the province of Teramo, situated on a rock crowned by a castle. Population, 7,227.

CLAFLIN, HORACE BINGHAM, merchant, born in Milford, Mass., Dec. 18, 1811, died in Fordham, N. Y., Nov. 14, 1885. He entered business life as clerk in his father's store, and in 1831 he formed a partnership with his brother and his brother-in-law, and succeeded to his father's business. A dry-goods store in Worcester was their next venture, and as it was successful Mr. Clafin came to New York city in 1843, and entered upon what proved to be a remarkably successful business career. The business of the house in which he held the chief interest during the last twenty years of Mr. Clafin's life exceeded that of any other similar house in the world. Mr. Clafin was an influential member of Henry Ward Beecher's church, a liberal contributor to Brooklyn's charities, and the benefactor of many young men who were in need of credit or money. He was a Republican until the election of 1884, and a vigorous opponent of slavery.

CLAIBORNE, or CLAYBORNE, WILLIAM, colonist, born in Westmoreland, England, about 1589, died in Virginia about 1676. He was appointed secretary of state for the dominion of Virginia by Charles I. in 1626, and in 1642 treasurer for life. His rights and claims were disputed by Lord Baltimore, and he finally gave up the struggle in support of them. He discovered Kent Island in 1631, and owned a large tract of land upon which Annapolis was built. Claiborne has been misunderstood by historians, but recent investigation has shown that he was the victim of court favoritism and injustice. By his friends he was called "the champion of Virginia," while others denounced him as the "evil genius of Maryland."

CLAIBORNE, WILLIAM C. C., an American statesman, born in Virginia in 1775, died in 1817. He represented Tennessee in the National Congress in 1797, and was appointed governor of the Mississippi Territory in 1802, and of Louisiana Territory in 1804; he was governor of the State of Louisiana from 1812 to 1816.

CLAIBORNE GROUP, a name given in America to certain beds of clay, lignite, shelly sands, and marly limestone which occur in the vicinity of Claiborne, Alabama, and are believed to belong to the Eocene system.

CLAIRAC, a town of France, in the department of Lot-et-Garonne, situated on the Lot. It has flour and paper mills, and considerable trade in white wines, and prunes. Population, 2,423.

CLAIRAUT, ALEXIS CLAUDE, a mathematician, born at Paris, May 13, 1713, died there May 17, 1765. He early exhibited a remarkable aptitude for mathematics, and at eighteen years of age was admitted into the Academy of Sciences. He wrote a number of scientific papers, but his fame rests principally upon his *Théorie de la Figure de la Terre* (1743), in which he promulgated the theorem that the variation of gravity on the surface of the earth, regarded as an elliptic spheroid, was altogether independent of the law of density; on his explanation of the motion of the lunar apogee, and on his computation of the time of the return of Halley's comet.

CLAIRVAUX, a village in the department of Aube, 10 miles above Bar-sur-Aube, on the left bank of the river. Its celebrated abbey was founded in 1115 by St. Bernard. It is now transformed into a great prison or house of detention. Population, 1,950.



CLAIRVOYANCE. See Britannica, Vol. XXII, pp. 404-7.

CLAM, the popular name of various genera of bivalve mollusks, of which the principal are the common hard-shell clam—the Indian quahaug—of the Atlantic coast of the United States; the long or soft-shelled clam, known in England as the cob; the fresh-water clam, which is properly a mussel; and the edible giant clam of the South Sea and the Pacific, which bears the largest and most beautiful of bivalve shells.

CLAN-NA-GAEL, THE, a secret organization founded in Dublin in 1869. Its avowed purpose was to keep alive the Irish national spirit, and to aid in the liberation of Ireland from English rule; also to secure a republican form of government for the Irish nation. Membership was confined exclusively to Irishmen, and all proceedings were guarded with the greatest secrecy, the members being bound by oaths, and protected by passwords and signs of recognition. At a later period of its existence it was also known as the United Brotherhood. American headquarters were established in Chicago and Philadelphia, with branches in all the principal American cities. An enormous following was secured. Each branch or section in the United States was known by a given number. Particular care was taken as to the character of those admitted to membership. Each member had his individual number, and on it a password was framed. Each candidate was required to swear that he entertained no mental reservations, and that he was not bound by any previous oath to expose anything relative to the order. A sword was used in the ceremony of initiation to signify that force only could accomplish the society's aim. A cipher was used by the simple device of writing the alphabetical letter next succeeding the real one required, thus: "Fohmboe" was by the initiated readily translated into "England;" "Ce" meant "Bd," an abbreviation for "Brotherhood." Each candidate solemnly pledged himself, under penalty of death, to keep the name and everything connected with the organization strictly secret from all not entitled to know the secrets, and also faithfully to preserve the funds of the society for the cause of a prospective Irish revolution. The oath was as follows: "I (name in full) do solemnly swear, in the presence of Almighty God, that I will labor while life is left me to establish and defend a republican form of government in J s f m b o e; that I will keep strictly secret the name and everything connected with the Ce from all not entitled to know such secrets; that I will obey and comply with the constitution and laws of the Ce, and that I will faithfully preserve the funds of the Ce for the cause of J s j t i 2evolution alone, as specified in the constitution; that I will deem it my special duty and mission to promote and foster sentiments of union, brotherly love and nationality among the J s j t i n f o; that I take this obligation without any mental reservation, holding the same forever binding upon me, and that any violation thereof, or desertion of any duty to the brotherhood is infamous, and merits the severest punishment. So help me God."

Very little was known by the American public about the Clan-na-Gael until the summer of 1889. In May of that year, Dr. Philip N. Cronin, a physician of high professional and social standing in the city of Chicago, suffered a violent and mysterious death. It was found by certain members of the order that he had in his possession evidence that would convict Clan-na-Gael officials of the misappropriation of large funds belonging to the society.

The parties writhed under the consciousness of guilt, and the fear of exposure drove them wild. It was determined to get rid of Dr. Cronin. A secret meeting was held, and a vote to "remove" him passed. He was enticed from his home on the plea that his professional services were needed by a person seriously ill. Quick to respond to such a call, he went to his death. While bending over his supposed patient, the blow was struck. His mutilated remains were discovered in a sewer basin in the outskirts of the city. In the investigation which followed the society was unearthed, its methods disclosed, four of its members convicted of the murder, three of whom were sent to prison for life, while the fourth was sentenced to imprisonment for three years.

CLANWILLIAM, a division of the Western Provinces, north of Cape Town, South Africa, embracing within its area the rich valley of Olifant River West, with a large stretch of mountain and "karroo" on each side. Chief village, Clanwilliam, on Jan Dissels River.

CLAP, THOMAS (1708-67), Congregational minister, and from 1739 to 1765, president of Yale College. He was born in Scituate, Mass., in 1703, graduated at Harvard in 1722, and preached at Windham, Mass., from 1726 to 1739. His learning and other qualities eminently fitted him for the position of president of the College, and he made important improvements in its various departments; he drew up a new code of laws, which were adopted by the trustees, and a new charter which was granted by the legislature; but his religious views led to his resignation in 1765, and he died in New Haven, Conn., in 1767. Thomas Clap, his great-grandfather, came to New England in 1630 and settled in Scituate, Mass., in 1640.

CLAUQUE (Fr., *claque*, "to clap the hands," or "applaud"), the name given to an institution for securing the success of a public performance or production, by bestowing upon it preconcerted applause, thus giving the impression that it is favorably received. The claque is of great antiquity, but first became a regularly organized and paid body during the time of the great Napoleon, in the famous struggle between Mademoiselle Georges and Mademoiselle Duchesnois at the Théâtre Français. The performances of the claque are directed by a leader, who arranges the points at which applause, laughter or tears are to be forthcoming, and each claqueur has a special role allotted to him. Thus, in various parts of the theater are placed *rieurs*, those who laugh at the comic sallies; *pleureurs*, those who weep at pathetic passages; *bisseurs*, who call *bis* or *encore*, and so on; while all occasionally join in hand-clapping and applause.

CLARE ISLAND, an island of Ireland, belonging to the county of Mayo, situated in the Atlantic at the entrance of Clew Bay.

CLAREMONT, a mansion at Esher, Surrey, Eng., 14 miles southwest of London, built in 1768 by Lord Clive at an expense of £100,000, and now the private property of Queen Victoria.

CLAREMONT, a manufacturing town of Sullivan county, N. H., 48 miles northwest of Concord. There are cotton, woolen and paper mills; also a water-wheel manufactory. The town has a large library and a high school.

CLARENCE, an English ducal title, first conferred in 1362 on Lionel, second son of Edward III and Philippa.

CLARENCEUX, or CLARENCIEUX, the first of the two provincial Kings-of-Arms, in England, whose jurisdiction of Clarenceux extends to all England south of the Trent, that of Norroy comprehending the portion north of that river.

CLARENDON, a small town of Rutland county, Vt., much visited by invalids on account of its mineral springs, the waters of which are efficacious in skin diseases and kidney complaints.

CLARENDON, CONSTITUTIONS OF, a series of ordinances, sixteen in number, made by a council of the nobility and prelates held at the hunting lodge of Clarendon in 1164, whereby King Henry II checked the power of the Church, and greatly narrowed the total exemption which the clergy had claimed from the jurisdiction of the secular magistrate. They defined the limit of the patronage as well as of the jurisdiction of the Pope in England, and provided that the Crown should be entitled to interfere in the election to all vacant offices and dignities in the Church. See ENGLAND, *Britannica*, Vol. VIII, p. 372; also Vol. I, p. 32.

CLARE, Sr., born in 1193, of a noble family of Assisi, in 1212 retired to the Portiuncula of St. Francis, and in the same year founded the order of Franciscan nuns, which spread rapidly through Europe. She died Aug. 11, 1253. Two years afterwards she was canonized by Alexander IV; her festival falls on August 12.

CLARETIE, JULES, real name ARSÈNE ARNAUD, French author, born at Limoges, Dec. 3, 1840. While still a school boy in Paris, he published a novel and became a contributor to the Parisian journals. His short story, *Pierrille* (1863), was praised by George Sand; and the novels *Mademoiselle Cachemire* (1865), and *Un Assassin*, renamed later *Robert Burat* (1866), were at once popular. He became one of the most important art and dramatic critics and political writers on the Paris press. During the Franco-German war he acquired the materials for a series of bright and vigorous anti-German books of an historical character, comprising *Histoire de la Révolution de 1870-71* (new ed., 5 vols. 1875-76); *Les Prussiens chez Eux* (1872); and *Cinq Ans après l'Alsace et la Lorraine depuis l'Annexion* (1876). He distinguished himself by his conduct during the siege of Paris. His more important later novels are: *Madeleine Bertin* (1868); *Le Train 17* (1877); *Monsieur le Ministre* (1881); and *Le Prince Zilah* (1884). He gained a firm footing on the stage through his pictures of the Revolution, *Les Muscadins* (1874); *Le Régiment de Champagne* (1877), and *Les Mirabeau* (1878); and in 1885 he succeeded M. Perin as director of the Théâtre Français. An English translation of his *Life of Camille Desmoulins* was published in 1876.

CLARIFICATION, the process of clearing a fluid from a turbid condition. Natural waters containing much organic matter are clarified by the addition of a little alum, which is precipitated with the organic matter, and the water then becomes healthy and refreshing. An addition of cold water to hot coffee, etc., causes a deposit to be thrown down, which clears the solution.

CLARINDA, a city at a railroad junction and the county-seat of Page county, Iowa. It is 62 miles southeast of Council Bluffs, and situated on the Nodaway River, and has a woolen factory and a flour mill.

CLARION, the county-seat of Clarion county, Pa. The village is in the oil region, and the prosperity of the place is much increased thereby. Clarion Seminary is here.

CLARK, ABRAHAM, one of the Signers of the Declaration of Independence, born in Elizabethtown, N. J., Feb. 15, 1726, died in Rahway, Sept. 15, 1794. By profession he was a surveyor and conveyancer and earned the title of "poor man's counselor." He was elected to the Continental Congress, serving from 1776 to 1783, with the exception of 1779, and he had a place in the New Jer-

sey legislature from 1782 to 1787, and from 1787 to 1788 was again in the Continental Congress. Mr. Clark has been called the "Father of the Paper Currency." From 1791 till his death he held a seat in the United States Congress.

CLARK, ALVAN, optician, born in Ashfield, Mass., March 8, 1804, died in Cambridge, Mass., Aug. 19, 1887. He was a farmer's son and became an engraver for calico print-works (1827-36), then a portrait painter, and ultimately became famous as a manufacturer of telescopes.

CLARK, ALVAN GRAHAM, astronomer, born at Fall River, Mass., July 10, 1832. He has discovered double stars, was a member of the expeditions which went to Spain to observe the total eclipse of 1870, and to Wyoming eight years later. Mr. Clark has invented several improvements in telescopes, and assisted in the completion of several famous lenses, among which are the Chicago refractor, the 30-inch for the Imperial Observatory at St. Petersburg, and the 36-inch refractor for the Lick Observatory in California, 1887.

CLARK, DANIEL, Senator, born at Stratham, Rockingham county, N. H., Oct. 24, 1809. He graduated at Dartmouth, 1834, studied law, was a member of the assembly five years, served in the United States Senate from 1857 to 1866, and afterward held other government offices. The resolution expelling from the Senate the Southern Senators who had left their seats on the secession of their States was offered by Senator Clark in 1861. President Johnson appointed him United States Judge for the New Hampshire district.

CLARK, DAVIS WASGATT, D. D., Methodist Episcopal bishop, born at Mount Desert, Me., Feb. 12, 1812, died in Cincinnati, O., May 23, 1871. He graduated at Wesleyan University in 1836; taught for seven years in Amenia Seminary, N. Y.; edited the "Ladies' Repository" from 1853 to 1864, when he was made a bishop. He afterwards labored in California, Oregon, and in the region south of the Ohio River. He was the author of *Elements of Algebra*; *Mental Discipline*; *Life and Times of Bishop Hedding*; and *Man All Immortal*.

CLARK, GEORGE ROGERS, an American general, born near Monticello, Albemarle county, Va., Nov. 19, 1752, died near Louisville, Ky., Feb. 18, 1818. In early life he was a surveyor and farmer, but he became distinguished as a leader of frontiersmen against the Indians and the British. All of the fertile region northwest of the Ohio River was wrested from the British by the valor of this soldier, yet he died in poverty. The State of Virginia sent him a sword after he had become old and poor, but he broke it in pieces, exclaiming, "When Virginia needed a sword, I gave her one. She sends me now a toy. I want bread!"

CLARK, HORACE FRANCIS, LL. D., railroad president and statesman, born in Southbury, Conn., Nov. 29, 1815, died in New York city, June 19, 1873. After graduating at Williams in 1833, Mr. Clark became a lawyer and won the reputation of being the hardest worker in the profession in New York city. He was twice elected to Congress (1856-61) on the Democrat ticket. In 1857 he became connected with the New York and Harlem Railroad as director, and afterward was president or director of a number of important roads. He was a manager of the Western Union Telegraph Company; president of the New York Union Trust Company; a successful operator in Wall street; and was one of the politicians who in 1871 broke the power of the Tweed ring. Com. Vanderbilt was the father-in-law of Mr. Clark.

CLARK, JONAS, patriot clergyman, born in Newton, Mass., Dec. 25, 1730, died in Lexington



Mass., Nov. 15, 1805. After graduating at Harvard, 1752, he became pastor of a church in Lexington, where he spent his life. Edward Everett said of Mr. Clark that he "rendered services second to no other, in enlightening and animating the popular mind on the great question at issue in Revolutionary times." John Hancock and Samuel Adams were at the house of Mr. Clark on the night of April 18, 1775, when Paul Revere took his famous ride, and warned them, among others, of the danger at hand. These two men asked Mr. Clark if his people would fight. "I have trained them for this very hour; they would fight, and, if need be, die too under the shadow of the house of God," he replied. The first blood of the Revolution was shed near his house, April 19, 1775, and when he saw the dead heroes he exclaimed, "From this day will be dated the liberty of the world!"

CLARK, LABAN, Methodist Episcopal clergyman, born in Haverhill, N. H., July 19, 1778, died in Middletown, Conn., Nov. 28, 1868. He was an itinerant preacher, and labored for half a century in Canada, New York and New England. The missionary society of the Methodist church was organized in consequence of a motion offered by Mr. Clark in 1819. He was one of the founders of Wesleyan University at Middletown in 1831, and president of its board of trustees until his death.

CLARK, LEWIS GAYLORD, author, born in Otisco, Onondaga county, N. Y., in 1810, died at Piermont, on the Hudson, Nov. 3, 1873. From 1834 to 1859 he edited the "Knickerbocker Magazine" and increased its popularity by writing the "Editor's Department," and contributing pleasant humorous stories to its columns. Among the contributors to the magazine were many famous people, and these persons collected their contributed articles, illustrated them with their portraits, and had them published in *The Knickerbocker Gallery*, devoting the proceeds of the book to purchase a residence for Mr. Clark at Piermont on the Hudson. This genial author numbered among his friends Charles Dickens.

CLARK, WILLIS GAYLORD, twin brother of the preceding, died in Philadelphia, June 12, 1841. He was editorially connected with the "New York Mirror," "Columbian Star," and the Philadelphia "Gazette," and wrote poetry and humorous sketches. *The Spirit of Life* was his longest poem. A volume entitled *Literary Remains*, containing his contributions to the "Knickerbocker Magazine," was issued by his brother.

CLARK, MYRON HOLLEY, governor of New York, born in Naples, Ontario county, N. Y., Oct. 23, 1806. From 1852 to 1854 he was State senator, and during his first term of service there were consolidated the various railroads that now form the New York Central. To Mr. Clark's influence is due the provision which limits passenger fares to two cents a mile. He was a temperance and anti-slavery man, and elected to be governor by the coalition of several parties, some of which called themselves "Republican," he was therefore the first State candidate elected on that ticket (1854).

CLARK, THOMAS MARCH, Protestant Episcopal bishop, born at Newburyport, Mass., July 4, 1812. He graduated at Yale, 1831, studied theology at Princeton, and became a Presbyterian pastor in his native town. Afterwards he became an Episcopal clergyman, held rectorates in Philadelphia, Hartford and twice in Boston. In 1854 he was consecrated second bishop of Rhode Island. Bishop Clark has published sermons, addresses, *Lectures to Young Men on the Formation of Character; The Efficient Sunday-School Teacher; and Primary Truths of Religion*.

CLARK, SIR ANDREW, F. R. S., Scottish physician, born at Aberdeen, Oct. 28, 1826, and educated at

Aberdeen and Edinburgh. After an exceptionally brilliant career as a student of medicine in the latter city, he became assistant to Dr. Hughes Bennett and Dr. Robert Knox the anatomist, and afterwards had charge for four years of the pathological department at the Haslar Naval Hospital. He subsequently settled in London, where he has acquired a high reputation for skill. He is president of the Royal College of Physicians, and consulting physician to the London Hospital. Dr. Clark is the author of numerous essays, lectures and reviews, and has for some time been Mr. Gladstone's medical attendant. He was created a baronet in 1883.

CLARK, WILLIAM GEORGE, English scholar and author, born in March, 1821, died at York, Nov. 6, 1878. He was educated at Sedburgh and Shrewsbury. He entered Trinity College, Cambridge, in 1840, and in 1844 was elected Fellow of his college, where he resided until 1878. He acted long as a tutor, and was public orator in the University from 1857 to 1869. Ordained in 1853, he resigned his orders in 1869, publishing his reasons in *The Present Dangers of the Church of England*. Clark edited the first series of *Cambridge Essays* (1855), and long acted as one of the editors of the "Journal of Philology." Other works were his edition of George Brimley's *Essays* (1858), and *Lectures on the Middle Ages and the Revival of Learning* (1872). His greatest work was the famous *Cambridge Shakespeare* (9 vols., 1863-66).

CLARK, WILLIAM SMITH, educator, born in Ashfield, Mass., July 31, 1826, died in Amherst, March 9, 1886. He graduated at Amherst and afterwards held professorships of chemistry and botany in that college. During the war of 1861-65 he served, and two years after its close, he became president of the agricultural college of Massachusetts. In 1876 he went to Japan, pursuing botanical studies and introducing into the United States new shade trees and seeds of foreign plants which proved of value. He was twice elected to the State legislature. As an author Prof. Clark contributed many papers on botany and chemistry.

CLARKE, CHARLES (1787-1877), and Mary Victoria Cowden, English authors. Charles was born at Enfield, Middlesex, Dec. 15, 1787, and early imbibed a passion for the theater. After his father's death, in 1820, he became a book-seller in London, and soon afterwards partner as music publisher with Alfred Novello, whose sister (born 1809) he married in July, 1828. The next year Mrs. Cowden Clarke began her famous *Concordance to Shakespeare's Plays*, published, after sixteen years' toil, in 1845. In 1834 Clarke began a twenty years' course of public lectures on Shakespeare and other dramatists and poets, which brought him much celebrity and profit. In 1859 he published *Carmina Minora*, a volume of original verse, and in 1863 he edited the poems of George Herbert. The joint productions of the pair were an edition of Shakespeare's works with annotations (1869), *Recollections of Writers* (1878), and the valuable *Shakespeare Key* (1879). In 1856 they went to live at Nice, but removed in 1861 to Genoa, where Charles died, March 13, 1877. Mrs. Clarke alone wrote several novels, volumes of verse, and other works. Of these the best known are the *Girlhood of Shakespeare's Heroines* (1850), and *World-noted Women* (1857).

CLARKE, HYNK, English financier and philologist, born in London in 1815, was employed in England as a civil engineer in the improvement of Morecambe Bay, and next in the promotion of telegraph and railway service in Upper India. In 1868 he founded the Council of Foreign Bondholders, whose affairs he administered for some years, and

he has done much to promote the Anthropological Institute and the Press Fund. His writings include books on mythology and comparative philology, especially on the native American languages and their supposed connection with those of the Old World; and a number of pamphlets on railways, foreign loans, banking, etc.

CLARKE, JAMES FREEMAN (1810-88), clergyman, born in Hanover, N. H., April 4, 1810. After graduating at Harvard in 1829, and at Cambridge divinity school in 1833, he held a pastorate in Louisville, Ky., for seven years, and then returned to Boston, where, in 1841, he established the Unitarian Church, known as the Church of the Disciples. The worship of his church combined some of the forms of the Protestant Episcopal Church, the silent prayer of the Friends, and the extempore prayer of the Congregationalists. Dr. Clarke was for several years an overseer of Harvard University and a lecturer and professor. His acquaintance with Margaret Fuller enabled him to prepare, with the assistance of William H. Channing and R. W. Emerson, a volume of memoirs. A large number of works were published by him and include the following: *Eleven Weeks in Europe; Christian Doctrine of Forgiveness of Sin; Service Book; Orthodoxy: its Truths and Errors; Self-Culture; Every-day Religion; and Vexed Questions.*

CLARKE, JOHN, physician, born in Suffolk, England, Oct. 8, 1609, died in Newport, R. I., April 20, 1676. He emigrated to Boston in 1637, and desiring more religious freedom than the colony afforded, he with others settled in Rhode Island, then called Aquidneck, in 1638. He is supposed to have drawn up the code of laws which governed the colony. For several terms he was elected to the general assembly of the State, and it is said that he was the first to show "in an actual government that the best safeguard of personal rights is Christian law." He has been called the "Father of Rhode Island," and also the "Father of American Baptists."

CLARKE, JOHN SLEEPER, comedian, born in Baltimore, Md., 1835, studied for the law, but abandoned it and went upon the stage in his native city. He made a success as a low comedian, and acted in Philadelphia, New York city, Boston and London. His home is now in England, although he was warmly received by the American public, who considered him almost equal to the comedian Burton.

CLARKE, MARY BAYARD, author, born in Raleigh, N. C., about 1830. Her father was Thomas P. Devereux, and she married Col. William J. Clarke. She has lived in Texas, Cuba and North Carolina. Among her writings are: *Reminiscences of Cuba; Mosses from a Rolling Stone; or, Idle Moments of a Busy Woman; Battle of Manassas; and Rebel Sock.* Besides writing prose and poetry Mrs. Clarke has translated Victor Hugo's *Marguerite, or Two Loves.*

CLARKE, McDONALD, the "Mad Poet," born in Bath, Me., June 18, 1798, died in New York city, March 5, 1842. He was an eccentric character, about whose life little was known till he came to New York city in 1819. He was the author of the oft-quoted lines:

"Night drew her sable curtain down  
And pinned it with a star."

Among his publications were the following poems: *A Review of the Eve of Eternity, and other poems; The Elixir of Moonshine, by the Mad Poet; The Belles of Broadway; Death in Disguise; and A Cross and a Coronet.*

CLARKE, REBECCA SOPHIA, author, born in Norwidge, Me., Feb. 22, 1833. She has written stories for young people; among her best are *Little*

*Prudy Stories; Flaxin Frizzle Stories; Dotty Dimple Stories; and Quinnebasset Girls.* Her pen-name is "Sophie May."

CLARKE RIVER, or FLATHEAD RIVER, a stream which drains a part of Montana, Idaho and Washington. It rises in the Rocky Mountains, flows northwest and finally reaches the Columbia River. Gold is found near its source.

CLARKSBURG, the county-seat of Harrison county, W. Va., situated at the place where the Elk and West Fork Rivers unite with the Monongahela. It has flour, woolen and saw-mills, electric lights, gas and water-works, two academies, fine public buildings, and in the vicinity of the town coke and coal are found.

CLARKSVILLE, the county-seat of Montgomery county, Tenn., 50 miles northwest of Nashville, on the Cumberland River. Tobacco is manufactured in large quantities. Iron mines are near the town. It is the seat of the Southwestern Presbyterian University. Population in 1890, 7,924.

CLARKSVILLE, the oldest town of Northern Texas and the county-seat of Red River county. It has various schools and churches, and is the center of a very fertile region.

CLARY (*Salvia sclarea*), a plant of the same genus with sage, a native of the South of Europe. Its flowers are used for making a fermented wine, esteemed for its flavor.

CLASSICS. The term *classici* was originally applied to those citizens of Rome that belonged to the first and most influential of the six classes into which Servius Tullius divided the population. As early as the second century after Christ it was applied figuratively to writers of the highest rank, and this mode of designation has since been generally adopted both in literature and art. As the great productions of writers and artists of antiquity have continued to be looked upon by moderns as models of perfection the word classics has come to designate, in a narrower sense, the best writers of Greece and Rome.

CLASTIC ROCKS (Greek *Klastos*, "broken"), rocks composed of fragmental materials. The term includes all rocks of a secondary or derivative origin, as conglomerate, sandstone, shale, etc., which have been formed out of the remains of previously existing rocks. Besides the large class of sand and gravel rocks, it also embraces many rocks of organic origin, such as certain limestones, composed of the debris of shells, corals, etc.; coals, made up of the remains of plants; some ironstones, consisting in whole or in part of organic debris, fragmental volcanic rocks, such as tuff and agglomerate, come also into the same division.

CLAUDE, St., a town of France in the department of Jura, at the confluence of the Bienne and Tacon Rivers. It has manufactories of cotton, paper, musical boxes, toys, and fancy articles of horn, bone, ivory, etc. Population, 6,632.

CLAUSEN, HENRIK, a Dutch divine and statesman, born in Laaland in 1793, died in 1877. He became professor of theology at Copenhagen in 1820; was chosen a deputy of the states in 1840, and became a member of the cabinet in 1848. His writings were chiefly on church history and biblical exegesis.

CLAUSEWITZ, KARL VON, Prussian general, born at Burg, June 1, 1780, died of cholera at Breslau, Nov. 16, 1831. He served with distinction in several campaigns in the Prussian and in the Russian service, in 1815 became chief of the Prussian army corps, and was ultimately director of the army school, and inspector of artillery. His writings prepared the way for a complete revolution in the theory of war. Of his works the best known



are his great book on war, *Vom Krieg* (3 vols. 4th edition, 1880), and his life of Scharnhorst.

CLAUSIUS, RUDOLPH, born in 1822; became professor at the Polytechnic Institution of Zurich in 1855, at the University of Würzburg in 1867, and at the University of Bonn in 1869. His calculations based upon the dynamical theory of heat, by which he shows the necessity of a Creator and the possibility of miracles, have won for him much distinction among scholars.

CLAVAGELLA, or CLUB-SHELL, a genus of lamellibranchiate mollusks of the same family with *Asperigillum*. These mollusks inhabit holes which they excavate for themselves in rocks or in masses of coral.

CLAVARIA, a genus of fungi, order *Hymenomycetes*, family *Clavariet*, in which the spore-bearing tissue is produced over all parts of the surface. The species are numerous, some of them simple and club-shaped, some branched. *C. botrytis*, a species common in oak and beech woods, especially in Germany, is gathered when young and used as food. Other species, notably *C. flava*, *coralloides*, *aurea* and *formosa*, are used in the same way.

CLAVICLE, an important part of the pectoral girdle of vertebrates, perhaps most familiarly known in the collar-bone of man and in the "merry thought" of birds. It is well developed in those mammals in which the fore-leg or arm is used very strongly and freely, but is poorly developed or absent in many cases, as in Carnivores and Ungulates. In most flying birds it is strong, and often fused to the breast-bone. It is a paired bone superadded from the skin as an auxiliary to scapula and coracoid. Its position is ventral and anterior to the coracoid, and it is often associated with an interclavicle. See ANATOMY, Britannica, Vol. I, p. 826.

CLAVICORNES, a great family of coleopterous insects, of the section *Pentamera*. Most of the beetles of this family feed on animal substance, and many of them find their appropriate food in substances undergoing decay. See Britannica, Vol. VI, p. 131.

CLAVIJERO, FRANCISCO HAVIER (1721-87) Mexican historian, born at Vera Cruz in 1721; entered the order of the Jesuits in 1748, and became a teacher of rhetoric and philosophy. On the suppression of the Jesuits in Spanish America in 1767, Clavijero retired to Italy, where he died at Bologna in 1787. He wrote in Italian a *History of Mexico*, an impartial and valuable work, of which an English translation by C. Cullen was published in 1787.

CLAXTON, KATE, actress, born in New York city in 1848, grand-daughter of Rev. Spencer H. Cone, an actor at one period of his life, and daughter of a colonel of the 61st New York regiment during the civil war. She made her dramatic debut as "Lotta" in Chicago, but created no enthusiasm till she appeared as "Mathilde" in *Led Astray*, 1873; in this she was a success, and she added to her reputation by acting "Louise" in *The Two Orphans*. While acting this part in Brooklyn, N. Y., the disastrous theater fire occurred, Dec. 5, 1876, and shortly afterwards a hotel in St. Louis, where the actress was staying, was burned. On both occasions she displayed great coolness and bravery. In 1876 she married a fellow-actor, Charles Stephenson.

CLAY, a term applied to those kinds of earth or soil which, when moist, have a notable degree of tenacity and plasticity. The clays appear to owe their origin to the decomposition of various rocks, and to consist chiefly of aluminic silicate, along with other ingredients, which vary in character with the nature of the parent rock from the degradation of which they are derived. Thus, common clay is a mixture of kaolin or China clay (which is a

hydrated clay), and the fine powder of some feldspathic mineral, which is anhydrous and not decomposed. The commoner varieties of clay and clay-rocks are: China clay, or kaolin; pipeclay, very like kaolin, but containing a larger percentage of silica; potter's clay, not so pure as the preceding; sculptor's clay or modeling clay, a fine potter's clay, sometimes mixed with fine sand; plastilina, a potter's clay from Italy, supposed to be composed of oil, glycerine, resin and powdered clay; brick-clay, an admixture of clay and sand with some ferruginous matter; fire-clay, containing little or no lime, alkaline earth or iron; shale, a laminated clay-rock; clay-slate, an indurated cleaved clay-rock; loam, a non-plastic mixture of clay and sand; marl, a clay containing much calcareous matter.

CLAY, CASSIUS MARCELLUS, politician, born in Madison county, Ky., Oct. 19, 1810.

While studying in Yale College, from which he graduated in 1832, he heard William Lloyd Garrison speak, and this influenced him to become an abolitionist, although his parents were slave-holders. Entering the legal profession on his return to Kentucky, he attained prominence and was elected in 1835 to the legislature. In 1837 and in 1840 he was sent to that official body; the improvements in the common schools and in the jury system of Kentucky are due to Mr. Clay's efforts. Mr. Clay was the supporter of Henry Clay for the presidency, the opposer of the annexation of Texas, and in 1845 the editor of an anti-slavery paper, "The True American," and was continually involved in quarrels. He served and was taken prisoner in the Mexican war, and aided in the election of President Taylor. He labored for the election of Fremont in 1856, and Lincoln in 1860. The following year he was sent as minister to Russia, but returned to America in 1862, being made major-general of volunteers. Refusing to serve so long as slavery was recognized, Mr. Clay left the Union army and went again to Russia, remaining as minister from 1863 to 1869.

After the war he supported the revolutionary movement in Cuba in 1870; he gave political support to Horace Greeley in 1872, to Samuel J. Tilden in 1876, and, although a Democrat, advocated the election of Mr. Blaine in 1884. For killing a negro, Perry White, in 1877, Mr. Clay was tried, but acquitted, the jury bringing in a verdict of "justifiable homicide," as the man, a discharged servant, had threatened his life.

CLAY CENTRE, a town of Kansas, county-seat of Clay county, situated on the Republican River about 125 miles west of Leavenworth. It contains a variety of manufactories, and is an important center of trade.

CLAY CROSS, a town in Derbyshire, England,  $4\frac{1}{2}$  miles south of Chesterfield, the center of a coal and iron district. Population, 6,879.

CLAY, HENRY. See Britannica, Vol. V, pp. 817-18.

CLAYMORE, the old Celtic one-handed, two-edged longsword. The name is now inaccurately given to the basket-hilted sword of the officers of Highland regiments.

CLAYTON, a village of Jefferson county, N. Y., on the St. Lawrence River at the western end of the region of The Thousand Islands. It is a railroad terminus, a summer resort, and a place where ships and skiffs are built.

CLAYTON, JOHN MIDDLETON, a jurist, born in Dagsborough, Sussex county, Del., July 24, 1796, died in Dover, Del., Nov. 9, 1856. He graduated at Yale in 1815; became a lawyer; was elected to the legislature in 1824; elected to the U. S. Senate in 1829 and 1835; was Secretary of State under President Taylor, and served in the U. S. Senate from 1845 to

1849, and from 1851 to 1856. He acquired a reputation for oratory while in the Senate; his best efforts being the speeches on the Foote resolution, in which he discussed nullification, the argument favoring the paying of French spoliation claims, and his defense of the Clayton-Bulwer treaty (negotiated by him while Secretary of State), and President Taylor's administration.

**CLAYTON-BULWER TREATY.** See Britannica, Vol. VI, p. 782.

**CLEARANCE**, in the mercantile marine, a permission from the custom-house officers for the departure of a ship from a port, denoting that all the formalities have been observed, and all dues, etc., paid. If a foreign vessel, she must also be certified by the consul of the nation to which she belongs.

**CLEAR, CAPE**, a headland of Clear Island, the most southerly point of Ireland, with a light-house and telegraph station.

**CLEARFIELD**, the county-seat of Clearfield county, Pa., on a railroad and the west branch of the Susquehanna. It has lumber manufactories, a foundry, machine shops, a public park and an academy.

**CLEARING-HOUSE.** See Britannica, Vol. III, pp. 328-29.

**CLEARING-HOUSE CERTIFICATES**, certain evidences of value, or of credit, taking the place of money for the time being, and especially used by the Clearing-House Association of Banks. It is one of the developments in banking procedure, whereby the clearing-house combination or association of banks constituting the clearing house is pledged to maintain the credit of every member of the association. Its beneficial effects will be readily comprehended by stating that if a bank is threatened with a run on its funds, and cannot convert its securities into ready cash to meet the contingency without heavy loss, owing either to the temporary or other depreciation in the value of the securities, or the inability at the moment to convert them into cash because of a possible stringency of the money market, the other banks in or of the association come to the rescue, by the issuance of certificates from the clearing house, which certificates are good at any bank in the association for their face value, and have the immediate effect of restoring confidence in the minds of depositors. For example, suppose, in the event of a "run" on a given bank, the demand for a million and a half of dollars is made; it would require three tons of gold coin to meet it, involving an immense expense as well as risk; whereas, under the system of clearing-house certificates there is a guaranty given that a sum sufficient to satisfy all demands has been deposited, subject to the return on demand, and the entire body composing the Clearing-House Association is pledged to maintain the integrity of the certificate.

The totals of the general proof being daily transferred to the ledger, reference to this is alone necessary to ascertain the dealings of each individual bank, day by day, month by month, and year by year, since it became a member of the association. There is a constant check upon irregularities, as all the banks are under the scrutinizing eye of the clearing house. Each one of the body fully realizes how greatly expulsion would jeopardize its credit. This latter feature has done much to prevent the undue extension of loans which would inevitably produce weakness and possible disaster. The system originated with Mr. F. W. Edmonds, formerly cashier of the Mechanics' Bank, New York city. He planned the issue of clearing-house certificates in 1852, and paved the way for the

smooth and successful business management subsequently developed in the banking world.

**CLEARING-NUT** (*Strychnos potatorum*), a small tree, a native of India, whose seeds are much used for clearing water. A seed rubbed around the inside of a vessel of muddy water causes the impurities to settle rapidly.

**CLEAR LAKE**, a sheet of water in Lake county, Cal. It is 24 miles long and from two to six miles broad, and is much frequented by hunters and tourists, on account of the various kinds of game which frequent its shores and the fish in its waters.

**CLEATS**, in ship-building, pieces of wood fastened to various parts of the vessel, and having holes or recesses for fastening ropes. There are several kinds applied to various purposes.

**CLEAVAGE**, or **SLATY CLEAVAGE**, the property possessed by many crystallized minerals of breaking easily into thin plates. Cleavage is the result of an operation which is subsequent to, and entirely independent of the original stratification of the rocks.

**CLEBURNE**, a village and town of Johnson county, Texas; about 60 miles southwest of Dallas, and 155 miles north of Austin. It had a population of 1,855 in 1880, and of 3,278 in 1890.

**CLEBURNE, PATRICK RONAYNE**, a soldier, born in Cork county, Ireland, March 17, 1828, killed in the battle of Franklin, Tenn., Nov. 30, 1864. He early discovered a predilection for the profession of arms, and enlisted in the 41st regiment of infantry in the English army. After several years in the military service, he came to the United States and located at Helena, Ark., where he adopted the profession of law, in which he was succeeding at the commencement of the civil war in 1861. He enlisted in the Confederate army as a private; contrived the capture of the United States arsenal in Arkansas in March, 1861, and was soon afterward promoted from the rank of captain to that of colonel. He was promoted to the grade of brigadier-general in March, 1862. At the battle of Shiloh he commanded a brigade in the third army corps, and signalized himself for courage and sagacity. He was made major-general in December, 1862, and commanded a division of the right wing of the Confederate army at the battles of Stone River and Chickamauga. He distinguished himself in covering the retreat of Gen. Bragg's army after the battle of Mission Ridge in November, 1863, and was commended by the Confederate Congress for his heroic and successful defense of Ringgold Gap. He was a division commander under Gen. Joseph E. Johnston during his famous campaign in North Georgia, and distinguished himself in a number of its various battles. He commanded a corps at the battle of Jonesboro, Ga., also at Franklin, Tenn., where he was killed in storming the second line of the Federal works.

**CLEF**, a musical character placed on the staff, by which the names of the notes are fixed. There are three clefs; namely, the G, the C and the F clef.

**CLEG**, a name given to some insects of the dipterous family *Tabanida*. The females are extremely troublesome to horses and cattle.

**CLEMATIS**, a genus of plants of the natural order *Ranunculaceae*, mostly herbaceous climbers. There are many species, natives of the temperate climates. *C. viticella*, *C. cylindrica*, and *C. virginiana*, or virgin's-bower, with white flowers, are the best known species in the United States. There are many forms in cultivation, with large flowers of various colors, mostly varieties or hybrids that have been obtained from *C. viticella* of Europe, *C. lanuginosa* of China, and the Japanese species, *C. azurea* and *C. florida*.



CLEMENCEAU, EUGÈNE, a French statesman, born at Mouilleron-en-Pared, in 1841. He early obtained distinction as a physician in Paris, where he was elected mayor of the 18th arrondissement in 1870, and member of the National Assembly in 1871. He became a member of the Chamber of Deputies in 1876, and was one of the committee of 18 who directed the resistance against the anti-Parliamentary party. He is proprietor of "La Justice," an important Paris journal. He is noted as being one of the most expert swordsmen in France.

CLEMENS, JEREMIAH, statesman, born in Huntsville, Ala., Dec. 28, 1814, died there May 21, 1865. After graduating at the State University he became a lawyer; was appointed United States marshal for Northern Alabama, and elected to the legislature in 1839, 1840, 1841 and 1843. He was connected with the army in 1842, when he went to Texas as lieutenant-colonel of volunteers, and in 1847-48 was an officer in the infantry. From 1849 to 1853 he was in the United States Senate, and in 1859 became editor, at Memphis, of the "Eagle and Enquirer." Popular feeling influenced him, and he became a secessionist, but in 1864 he declared for the Union cause. He was the author of several novels, some of which dealt with American history. Just previous to his death he was at work on a history of the war.

CLEMENS, SAMUEL LANGHORNE, an American humorist, born at Florida, Mo., Nov. 30, 1835. He is best known by his *nom-de-plume*, "Mark Twain," which had been the pen-name of Capt. Isaiah Sellers, who, previous to 1863, furnished river news to the "New Orleans Picayune," and which was derived from the call of the leadsman on the Mississippi River boat when he sounds two fathoms. Mr. Clemens's education was chiefly obtained in the printing office, he being apprenticed to a printer at the age of thirteen, and he worked at the trade in St. Louis, Cincinnati, and New York, and in 1851 became river pilot on the Mississippi. He followed mining and newspaper work in Nevada and California; made a trip to the Hawaiian Islands in 1866; lectured in California and Nevada; made a tour through Europe, Egypt and the Holy Land; and since 1870 has lived at Hartford, Conn., employing his time in writing books or delivering lectures. He established in 1884 the publishing house of C. L. Webster & Co., in New York city, and this firm brought out Gen. U. S. Grant's *Memoirs*. Among Mr. Clemens's most popular books are: *The Innocents Abroad*; *Roughing It*; *Adventures of Tom Sawyer*; *The Prince and the Pauper*; and *A Yankee at the Court of King Arthur*.

CLEMMER, MARY, author, born in Utica, N. Y., in 1839, died in Washington, D. C., Aug. 18, 1884. This was the maiden name of Mrs. Edmund Hudson; but as she wrote for many years under the name Clemmer, she was best known by it. Her first literary work was for the "Springfield Republican," and she afterwards gained reputation by the "Woman's Letter from Washington," which for years regularly appeared in the "New York Independent." She was the friend of Alice and Phoebe Cary, and wrote their biographies. Monographs on Margaret Fuller, George Eliot, Charles Sumner, Longfellow, and Emerson were from her pen. She was the author of *Victoria*; *Eirene*; *His Two Wives*; *Ten Years in Washington*; and a volume of poems. She was married to Rev. Daniel Ames, but was divorced, and married Mr. Hudson in 1883.

CLEOMEDES, a Greek writer on astronomy. Nothing is known regarding his life, nor the period when he flourished. His treatise is entitled *The Circular Theory of the Heavenly Bodies*, and is remarkable as containing several truths of modern

science—such as the spherical shape of the earth, the revolution of the moon about its axis, etc. Cleomedes's treatise was first printed in Latin in 1498, and the last edition in German in 1832.

CLERC, LAURENT, educator, born in La Balme, near Lyons, France, Dec. 26, 1785, died in Hartford, Conn., July 18, 1869. When only a year old he fell into the fire, and was so injured that he lost the sense of smell and hearing. Several years later Abbé Sicard took the lad and gave him so good an education that he became a teacher. Rev. Dr. Gallaudet persuaded him to come to America, and found an institution for the instruction of the deaf and dumb. This he did, and in 1817 such a school was opened at Hartford, and M. Clerc devoted the rest of his life to this work.

CLERK, JOHN, of Eldin, writer on naval tactics, born in 1728, died May 10, 1812. He prospered as an Edinburgh merchant, and by 1773 purchased the small estate of Eldin at Lasswade, where he devoted himself to etching, to geology, and to studying deeply both the theory and practice of naval tactics. On April 12, 1782, his maneuver for breaking the enemy's line was tried, and a decisive victory was gained over the French.

CLERK, JOHN (1757-1832), son of the naval writer, was raised to the Scottish bench in 1823, when he assumed the judicial title of Lord Eldin.

CLERK, PARISH, an official in the Church of England, who leads the responses in the congregation, and assists in the services of public worship, at funerals, etc.

CLERMONT-DE-LODEVE, a town in the department of Hérault, 23 miles northwest of Montpellier. It has extensive manufactories of woollen cloth. Population, 5,685.

CLERUS, a genus of insects of the order *Coleoptera*, section *Pentamera*, and of the great family *Serricornes* (see *Britannica*, Vol. VI, p. 132). There are about 20 species of this genus in the United States. Their larvæ feed on the larvæ of different kinds of bee.

CLEVELAND, a wild mountainous district, with some picturesque fertile valleys, forming the east part of the North Riding of Yorkshire, England. In the south the hills rise 1,300 to 1,850 feet. An extraordinary change has been wrought in the aspect of the country by a rich discovery of ironstone in the Cleveland hills; since 1851 lonely hamlets have become populous towns. The ironstone is chiefly an argillaceous carbonate, inferior in quality to the ironstone of the coal-measures.

CLEVELAND, a city of Ohio (see *Britannica*, Vol. V, p. 828). The population of the city has increased from 160,146 in 1880 to 261,546 in 1890, and its growth in business and wealth has been correspondingly rapid. There were in 1890 2,500 manufacturing establishments, employing 40,000 persons, with an annual production of \$85,000,000. The city contains eight ship-yards, two of them of immense proportions, constructing iron and steel vessels. A harbor of refuge, constructed by the United States Government and costing nearly \$2,000,000, was completed during the last decade, and the great viaduct extending from the lake on the east side to the top of the hill on the west side, costing \$2,225,000, was completed a little earlier. The public library contains 50,000 volumes.

CLEVELAND, a railroad junction and the county-seat of Bradley county, Tenn.: It is an educational town and contains an academy, a female institute, and the largest southern female college.

CLEVELAND, CHARLES DEXTER, educator, born in Salem, Mass., Dec. 3, 1802, died in Philadelphia, Pa., Aug. 18, 1869. Graduating at Dartmouth in

1827, he became a teacher of Latin and Greek in Dickinson College, and afterwards in the New York University, and in a young ladies' school in Philadelphia. He was appointed consul to Cardiff, Wales (1861-67). Prof. Cleveland was the author of several works on English, American, and classical literature, text-books and song-books for schools, and prepared a concordance to Milton's poems.

CLEVELAND, GROVER, the twenty-second President of the United States, born in Caldwell, Essex county, N. J., March 18, 1837. He was christened Stephen Grover, in honor of Rev. Stephen Grover, pastor of the Presbyterian church at Caldwell, but the first name was omitted in his early life. When four years old his parents removed to Fayetteville, N. Y., where Grover received an academic education, and afterwards became a clerk in a country store. At the age of 17 he became an assistant teacher in the New York Institution for the Blind in New York city. In 1855 he went to Buffalo and assisted his uncle, Lewis F. Allen, in the compilation of the *American Herd Book*, and in August of that year entered the law office of Rogers, Bowen & Rogers, in Buffalo, as a student-at-law. He was admitted to the bar in 1859, and in 1863 was appointed assistant district attorney of Erie county, a position which he retained for three years. In 1865 he was the Democratic candidate for district attorney, but was defeated. He then became a law partner of Isaac V. Vanderpool in Buffalo, and four years later a member of the law firm of Lansing, Cleveland & Folsom. In 1870 he was elected sheriff of Erie county, and at the close of his term of office formed the law firm of Bass, Cleveland & Bissell, which subsequently became the firm of Cleveland & Bissell, Mr. Bass having retired on account of failing health. In 1881 Mr. Cleveland was elected mayor of the city of Buffalo on the Democratic ticket, and by his fearless use of the veto prerogative soon became known as the "veto mayor." In 1882 he received the Democratic nomination for governor of the State of New York, and was elected by a plurality of 192,854 over the Republican nominee, Charles J. Folger. July 11, 1884, the Democratic national convention nominated him for the Presidency of the United States, he receiving 683 votes out of a total of 820. James G. Blaine was the Republican candidate, and the canvass which followed was remarkable more for the discussion of the personal characters and qualifications of the respective candidates than for the discussion of political issues. In the election which followed Mr. Cleveland received a majority of 37 in the electoral college and a majority in the popular vote of 23,005 out of a total of 10,067,610. His administration of the Presidential office was marked by the same unprecedented use of the veto power which had characterized his administration of the gubernatorial office. June 2, 1886, President Cleveland married, in the White House, Frances Folsom, daughter of his former law partner. With the exception of Mrs. Madison, Mrs. Cleveland was the youngest of the many mistresses of the White House, having been born in Buffalo, N. Y., in 1864. In 1888 Mr. Cleveland was renominated for the Presidency by the Democratic national convention, but was defeated by the Republican candidate, Benjamin Harrison. In June, 1892, Mr. Cleveland was again nominated at Chicago by the Democratic National Convention.

CLEVELAND, ROSE ELIZABETH, sister of Grover Cleveland, born in Fayetteville, N. Y., in 1846, educated at Houghton Seminary, Clinton, and became a teacher in that institution, and somewhat later assumed charge of the Collegiate institution

at Lafayette, Ind. She has lectured before several schools on historical subjects, and has written a book entitled *George Eliot's Poetry and Other Studies*; and a novel entitled *The Long Run*. For a short time she was editor of "Literary Life," a Chicago magazine.

CLEW, or CLUE, a name given to the lower corner of square sails, and the aftermost lower corner of stay-sails.

CLEW BAY, an inlet of the Atlantic, on the west coast of Mayo county, Ireland. Old Red Sand Stone, Carboniferous limestone, and Cambrian strata form the shores of the bay. The upper part of the bay contains an archipelago of 300 fertile and cultivated islets.

CLICHÉ, the impression made by a die in melted tins, or other fusible metal. It is the proof of a die-sinker's work, by which he judges of the effect, and ascertains the stage of progress reached before the die is hardened. The same term is applied by the French to stereotype casts from woodcuts.

CLICK-BEETLE, the popular name given to many species of coleopterous insects of the family *Elateridae*. They are so called from springing into the air with an audible click, when placed on the back. The American species are very numerous, and in the imago state feed on vegetables. See *Britannica*, Vol. VI, p. 132.

CLIENT, a term in universal use in the United States and England to designate the person who employs an attorney, counselor, or other member of the legal fraternity, either to conduct a case or to give legal advice.

CLIDASTES, a remarkable genus of snake-like reptiles found in the cretaceous formation of North America. They have an additional articulation of the vertebrae. About 12 species have been described.

CLIFFORD, WILLIAM KINGDON (1845-79), an English mathematician. In 1870 he accompanied the English expedition to the Mediterranean to observe the solar eclipse, and in 1871 became professor of applied mathematics at University College, London. On account of failing health he spent the summer of 1876 in Spain and Algiers, and in 1878 was again compelled to seek rest in Madeira, where he died the following year.

CLIFF DWELLINGS. See *Britannica*, under *METEORA*, Vol. XVI, p. 114; and *INDIANS, AMERICAN*, Vol. XII, pp. 822-33, and in these Revisions and Additions.

CLIFTON SPRINGS, a health resort of Ontario county, N. Y. It has large sulphur springs and a building devoted to invalids, called the Clifton Springs Sanitarium.

CLIFFORD, NATHAN, jurist, born in Rumney, N. H., Aug. 18, 1803, died in Cornish, Me., July 25, 1881. He adopted the legal profession, was in the State legislature from 1830 to 1834, was attorney-general for the State from 1834 to 1838, and subsequently served two terms in Congress. In 1846 he was called to President Polk's cabinet as attorney-general, and in this capacity he made important treaties with Mexico. California was annexed to the United States according to the terms of one of these treaties. In 1858 he became associate justice of the Supreme Court, and in 1877 it was his duty as senior associate judge to preside over the electoral commission of that year; and although Judge Clifford believed Mr. Tilden elected, he conducted the proceedings impartially, and the court declared for the election of Mr. Hayes.

CLIFTON, a town of Ontario, and a port of entry, situated on the Niagara River, two miles below the Falls. The river is here crossed by the great railroad suspension bridge, and the view of the Falls from the town is magnificent.



**CLIMACTERIC YEAR**, a period in which some great change is supposed to take place in the life of man. The mystical number seven and its multiples were believed to constitute a turning point in his health and fortune. The most important of all was the sixty-third year, and was called the "climacteric year," or "grand climacteric," which was supposed to be fatal to most men; its influence being attributed to the fact that it is the multiple of the two mystical numbers, 7 and 9.

**CLIMATE**. See *Britannica*, Vol. VI, p. 1, and Vol. XVI, pp. 114-84.

**CLIMAX**, a Greek word signifying primarily a stair, and in rhetoric that artifice which consists in placing before the mind of the reader or hearer a series of propositions or objects so arranged that the least forcible strikes it first, and the others rise by successive gradations in impressiveness.

**CLIMBERS**, the birds of the order *Scansores*, so called from their climbing habits. They have two toes before opposed by two behind, so as to adapt their feet for the purpose of grasping the branch of a tree or any similar object. To this order belong parrots, toucans, wood-peckers, cuckoos, etc.

**CLIMBING-PERCH** (*Anabas scandens*), a fish of the family *Anabasidae*, found in the rivers of the East Indies. In climbing the fish is said to suspend itself by its spiny gill-covers, and, fixing its anal fin in cavities of the bark, to urge its way upward by distending and contracting its body.

**CLIMBING PLANTS**, or **CLIMBERS**, those plants which, having weak stems, seek support from other objects, chiefly from other plants, in order to ascend from the ground. This is accomplished in different ways. Some climb by means of small root-like processes growing from the stem, some by means of tendrils, some by adhering disks, and many by the twining of their stems around those to which they cling.

**CLINCHER-BUILT**, a term applied in ship-building when the lower edges of the side-planks overlap the next row under them, like slates on the roof of a house. If the planks are all smooth, meeting edge to edge, the construction is called *carvel-built*.

**CLINCH RIVER**, a stream 300 miles in length, which rises in southwest Virginia, enters Tennessee, and at Kingston unites with Holston River to form the Tennessee.

**CLINGMAN'S DOME**, the second highest peak of the Appalachians. It is in Swan county, N. C., and belongs to the Great Smoky Mountains. Its height is 6,860 feet, and it was named in honor of Thomas L. Clingman, who ascended it in 1858.

**CLINICAL, BAPTISM**: in the ancient church, baptism administered to a person on a sick or death-bed.

**CLINICS** (Latin, *clinicus*, a bed-ridden person), that form of medical or surgical instruction given by the professors or lecturers to their classes, but imparted at the bedside, or in the presence of the patient, in illustration of the disease under which he is suffering, and detailing its proper treatment, effects of treatment, and the varieties of forms under which it is encountered. The study of *clinics* has been gradually extended until it covers all that relates to the practical knowledge of any given disease. It is regarded as the most valuable mode of instruction in the art or science of medicine or surgery. In its practical workings it is most satisfactory; the students accompany the physician, surgeon, or professor in his rounds through the hospital wards, and are there carefully instructed in the various phenomena of disease or injury, taught to observe the characteristics of individual cases, and to study the effects of the different modes of treatment. Clinical medicine was for many ages sadly

neglected, but attention was renewed about the beginning of the 18th century—the eminent physician Boerhaave so successfully re-animating the subject that the system of instruction involved was thoroughly carried out. Since that time it has come into general use, until every good medical school has a clinic established, or intimately connected with it.

**CLINKER**, the name given to the scales or globules of black oxide of iron obtained from red-hot iron under the blows of the hammer. The term is also applied to the slags of iron furnaces. By geologists cindery masses which form the crust of some lava-flows are termed clinkers.

**CLINOMETER**, an instrument for taking the dip and strike of a stratum. It consists of a compass provided with a small spirit-level, and having on the lid a small graduated quadrant and a plumb-line.

**CLINTON**, a salt-producing village in Huron county, Ontario, situated on a branch of the Grand Trunk Railroad.

**CLINTON**, a city of Illinois, a railroad center and the county-seat of DeWitt county.

**CLINTON**, a city of Iowa, and county-seat of Clinton county (see *Britannica*, Vol. VI, p. 7). The city has grown rapidly since 1880, and supports one daily and several weekly newspapers, two national banks, a high school, numerous graded schools, and a large public library. Its manufacturing are extensive, consisting of saw-mills, paper mills, iron foundries, chair factories, repair shops, sash and door factories, asphaltum works, canning works, flour mills, etc. Lumber and grain are the chief articles of export. Population in 1880, 9,052; in 1891, 13,629.

**CLINTON**, a cotton-shipping town of East Feliciana parish, La. It is the capital of the parish, and connected by a 25-mile railroad with Port Hudson on the Mississippi River.

**CLINTON**, a city of Massachusetts, at the junction of the Worcester and Nashua, and the Boston, Clinton and Fitchburg Railroads (see *Britannica*, Vol. VI, p. 7). Clinton has but recently received a city charter. Among the principal manufactures are gingham, plaids, Brussels and Wilton carpets, and machinery. The Lancaster mills are located here, and employ about one thousand operatives. Population in 1880, 8,029; in 1890, 10,379.

**CLINTON**, a handsome town in Missouri, county-seat of Henry county, forty miles southwest of Sedalia, is an important center of trade.

**CLINTON**, a railroad junction of Oneida county, N. Y., chiefly known for its educational institutions. Here are Hamilton College, four seminaries for young ladies, and one for boys. The village is on the Chenango canal. In its vicinity building stone and iron ore are found.

**CLINTON, CHARLES**, ancestor of the Clintons in the United States, born in county Longford, Ireland, in 1690, died in Orange county, N. Y., Nov. 19, 1773. In May, 1729, Charles Clinton with a party of friends set out for Philadelphia, but the captain proved dishonorable and landed them at Cape Cod in October of that year. Two years later the party settled in Ulster county, N. Y., some sixty miles north of New York city, and about six miles west of the Hudson River. Mr. Clinton was a farmer and land surveyor; he became county judge and was lieutenant-colonel in Oliver DeLancy's regiment, serving under Col. Bradstreet at the capture of Fort Frontenac.

**CLINTON, DeWITT** (1769-1828), American statesman. See *Britannica*, Vol. VI, p. 7.

**CLINTON, GEORGE**, a colonial governor. He became governor of Newfoundland in 1732, and in 1742

of New York. In 1753 he was succeeded by Sir D. Osborne, and later became governor of Greenwich Hospital. In 1745 he was appointed vice-admiral of the red, and twelve years later admiral. He died in 1761.

CLINTON, GEORGE (1739-1812), American statesman. He was with his brother James as lieutenant in the expedition against Fort Frontenac, and later became clerk for the colonial governor. In 1768 he was elected to the New York Assembly, where he maintained the cause of the colonies against the crown, and in 1776 he was called by Washington to take post in the Highlands with rank as general of militia. In the spring of 1777 he was a deputy to the New York provincial congress, and the same year was made brigadier-general in the Continental Army. From 1777 to 1795 he was successively elected governor of New York, during which period he exhibited great energy of character, and rendered important service to the State. In 1800 he was chosen to the State legislature, and the following year again became governor. In 1804 he was made vice-president of the United States, and filled the office until his death, eight years later.

CLINTON, SIR HENRY (1738-95), a British general. In 1758 he was captain of the Guards, and in 1775 became major-general, and was sent to Boston with Burgoyne and Howe. In 1778 he was appointed commander-in-chief of the British forces in America, with the rank of lieutenant-general, and while holding this rank dealt the heaviest blows the Americans received during the Revolution. He returned to England in 1782, and was elected to Parliament; later he was made governor of Limerick, and in 1793 was appointed to the command of Gibraltar. He wrote several works on his campaign in America.

CLINTON, JAMES (1738-1812), an American soldier. During the war of 1756, between the English and French, he was captain under Bradstreet, and in consideration of the services rendered at the capture of Fort Frontenac he was appointed captain commandant of four regiments levied for the protection of the western frontiers of Ulster and Orange counties, N. Y. In 1775 he became colonel of the 3d New York regiment, and in 1776 was made brigadier-general. After the war he was a commissioner to adjust the boundary-line between Pennsylvania and New York; was a member of the New York legislature, and one of the convention that adopted the Constitution of the United States.

CLINTON GROUP, a name given by American geologists to a subdivision of the Upper Silurian series. The group is of special interest as containing important deposits of iron ore. The name is given with reference to the town of Clinton, N. Y.

CLIO, in Grecian mythology, the daughter of Jupiter and Mnemosyne, the mother of Hyacinthus and Hymenæus. She was the Muse of history and epic poetry, and was represented as bearing a half-opened roll of a book.

CLIO, a genus of shell-less pteropodous mollusks, of which one species, *C. borealis*, is extremely abundant in the Arctic seas, and constitutes a principal part of the food of whales.

CLIPPER, a name familiarly given to a sailing-ship built expressly for speed.

CLITZ, HENRY BOYNTON, an American soldier, born in 1824. He served during the war with Mexico, and was brevetted first-lieutenant. From 1848 to 1855 he was an assistant instructor at West Point. At the beginning of the civil war he went into active service, and was on duty until July 1, 1865, when he was placed on the retired list, at his own request, having in the mean-time received the successive promotions to the rank of colonel.

CLIVE, KITTY, an English actress, born in London in 1711, died Dec. 6, 1785. She was the daughter of William Rafter, an Irish Jacobite lawyer. She came out at Drury Lane about 1728, and there chiefly continued to play until her retirement to Twickenham in 1769. About 1781 she was married to George Clive, a barrister, from whom she soon afterwards separated. She was admired by Garrick, Handel, and Horace Walpole, and Dr. Johnson said of her that in "sprightliness of humor he never had seen her equal."

CLOACA, in zoölogy, the technical name for the common terminal chamber into which the alimentary canal, the genital, and the urinary ducts, all open. A cloacal chamber and aperture occurs in many fishes, in all amphibians, reptiles, and birds, and in the three lowest mammals. In all other mammals the urino-genital orifice is independent of the end of the alimentary canal, or anus.

CLOACA MAXIMA (see Britannica, Vol. XX, p. 814), the most important of the sewers of ancient Rome; according to tradition, constructed by Tarquinius Priscus, or by Tarquinius Superbus, to drain off the stagnant waters of the Velabra, a swampy land between the Capitoline and Palatine hills, on which stood the Forum, and also the Circus Maximus. The sewer was flushed by a continual stream of superfluous water from the aqueducts. Large portions of this and of the other cloacæ remain entire after two thousand years, but the greater part is buried, by the accumulation of soil, at a considerable depth below the present level of the streets. During the Republic, the surveillance of the Roman cloacæ was one of the duties performed by the censors. Under the empire, officers called *curatores cloacarum urbis* were appointed for their supervision. So thoroughly was the city undermined by these large sewers that Pliny calls it *urbs pensilis*, a city suspended in the air rather than resting upon the earth.

CLOCKS. See Britannica, Vol. VI, p. 13; and Vol. XXII, p. 779.

CLOGHEEN, a town in the southwest of Tipperary county, Ireland. Extensive flour mills are here. Six miles northwest of Clogheen are the famous limestone caves of Mitchellstown. Population, 1,317.

CLOGHER, a decayed city of Ireland, the see of a Roman Catholic bishop, in the south of Tyrone, on the Blackwater River. Population, 225.

CLONAKILTY, a seaport town in the south of Cork county, Ireland. Its chief export is grain, and it has several corn and flax mills. Population, 3,676.

CLONES, a town of Ireland, in the county of Monaghan. It has some ancient remains, including the ruins of a monastery dating from the 5th century, and of a round tower. It has manufactories of linen, and corn mills. Population, 2,150.

CLONFERT, an ancient episcopal city of Ireland, in the extreme east of County Galway. Population, 2,200. The bishopric was founded in the 6th century, and ceased to be a separate Anglican one in 1602, being ultimately incorporated with Killaloe; but it is still the see of a Roman Catholic bishop. There is another Clonfert, a parish in County Cork.

CLONTARF, a town in the county of Dublin, about three miles northeast of Dublin city. Clontarf is celebrated in history as the place where, in 1014, Brian Boroihme won a great victory over the Danes, a battle forming the subject of Gray's ode, *The Fatal Sisters*. Population, 4,210.

CLOSE in heraldry, when the wings of a bird are close to the body, it is described as close. The term is used only with reference to birds addicted to flight, such as the eagle, falcon, etc. Of other do-



mestic fowls it is understood that their wings are in this position.

**CLOSE-HAULED**, in nautical language, the mode in which the sails are arranged in order to make the ship move in a direction the nearest possible toward that point of the compass from which the wind blows.

**CLOSET**, in heraldry, the half of the bar.

**CLOSSE**, RAPHAEL LAMBERT (1620-82), a Canadian soldier. In 1642 he was made sergeant-major of the garrison of Montreal, and soon became noted for his skill in fighting the hostile tribes. In 1658 he received the fief of St. Lambert as a reward for his services, and in 1672 another was bestowed upon his widow. He was killed while trying to rescue some workmen who had been attacked by Iroquois.

**CLOTHO**, a genus of spiders, of which there is only one known species, a native of the south of Europe and north of Africa.

**CLOUD**, St., a town of France, in the department of Seine-et-Oise, situated on the declivity of a hill near the Seine, five miles west of Paris. Population, 2,378.

**CLouDBERRY** (*Rubus Chamæmorus*), a plant related to the bramble, although of very different appearance, having an herbaceous single-flowered stem, destitute of prickles. The plant is eight to ten inches in height; the leaves few, large, lobed, and kidney-shaped; the flowers large and white; the fruit orange red; equal in size to a bramble-berry, and of an agreeable flavor. It is a native of the northern parts of Europe, Asia, and America. The fruit is highly valued.

**CLOUDS**. See Britannica, Vol. XVI, pp. 114-84.

**CLOVE BARK**, a commercial bark which is formed of several pieces of thin and hard bark, rolled up one over the other. It has a deep brown color, and a taste similar to that of cloves. It possesses properties analogous to those of cinnamon.

**CLOWES**, WILLIAM C. (1540-1604), an English surgeon, who served with Leicester in the Low Countries, and also on board the fleet that defeated the Spanish armada. He became surgeon to the queen, and after a prosperous practice in London retired to a country-house in Essex, where he died in 1604. He was the author of several books, two of which were long popular: *A Proved Practice for All Young Chirurgicalians* (1591); and *A Treatise on the Struma* (1602).

**CLUBBING**, in cabbages, turnips, and other plants of the genus *Brassica*, a diseased growth of tubercular excrescences, in the upper part of the root or lower part of the stem, caused by the larvæ of the cabbage-fly and of other insects, by which the vigorous growth of the plant is prevented, and crops are often much injured.

**CLUNCH**, a name given by miners to any tough, indurated clay, such as is sometimes found in the coal-measures, or in newer strata. The term has also been applied to the lower and harder beds of the cretaceous rocks.

**CLUNES**, a borough of Victoria, Australia, 119 miles northwest of Melbourne. Gold-mining and grazing are the chief industries. Population, about 5,000.

**CLUPEIDÆ**, an important family of malacopteron fishes, nearly allied to the *Salmonidæ*. To this family belong the herring, pilchard, anchovy, etc.

**CLUPESCIDÆ**, a group of malacopteron fishes, exhibiting characters intermediate between those of the *Clupeidæ* and of the *Esocidæ*. To this family belongs the genus *Arapaima* and the genera *Heterotis* and *Butirinus*.

**CLUSERET**, GUSTAVE PAUL, a French-American soldier, born in 1823. He served in the French

army until 1862, when he emigrated to the United States, entered the Union army, and was made aid-de-camp to General McClellan with the rank of colonel. He served in several important battles, and was brevetted brigadier-general for gallantry. He returned to Europe in 1867, and subsequently was arrested several times in consequence of his political attacks on the French government; but he escaped punishment on the plea that he was a naturalized American citizen. He settled near Geneva, Switzerland, in 1872.

**CLUSIA**, a tropical American genus of shrubs and trees of the natural order *Guttiferæ*. *C. rosea* yields an abundant resin, which is used as an external application in veterinary medicine, and for covering boats instead of pitch. *C. insignis*, the wax-flower of Demerara, is used to make a stimulating and soothing plaster.

**CLUSONÉ**, a town of Lombardy, Northern Italy, situated near the left bank of the Serio. It has manufactories of linen, a trade in corn and iron, and in the vicinity are copper foundries and vitriol works. Population, 3,883.

**CLUSTERED COLUMNS**, one of the richest features in Gothic ecclesiastical architecture. The columns or shafts are sometimes attached one to another throughout their whole length, sometimes only at the base and capital.

**CLWYD**, a river of North Wales. It flows north through Denbigh and Flint shires to the Irish Sea.

**CLYDE**, a village of Wayne county, N. Y., on the Clyde River. It has manufactories of glass, steam-engines and farming implements.

**CLYDE**, a village of Ohio, 17 miles southwest of Sandusky. It produces various manufactures, including flour and edge-tools.

**CLYMER**, GEORGE (1739-1813), a Signer of the American Declaration of Independence. He held various important positions as a defender of colonial rights, and in 1775 became one of the first Continental treasurers. On July 20, 1776, Mr. Clymer, with four others, was appointed by the legislature to succeed those members of the Pennsylvania delegation who had refused their assent to the Declaration of Independence, and had left their seats in Congress. He was reelected to Congress in 1777, and in 1788 was elected to the first Congress held under the provisions of the Federal Constitution. In 1796 he withdrew from public life after a career 30 years of which had been given to the interests of his country.

**CLYMER**, MEREDITH, an American physician, born in 1817. He graduated in medicine in 1837, and subsequently studied in London, Paris, and Dublin. He began practice in Philadelphia, but shortly afterward removed to New York. He accepted the position of professor in several colleges, among them being the University of the City of New York, and the Albany Medical College. During the civil war he was surgeon of the United States volunteers. He has written numerous works on medical subjects.

**CLYSTER**, called also *enema*, a medicine administered in the liquid form through the rectum. It is used either for the purpose of procuring evacuation of the bowels, or for conveying stimulants or nourishing substances into the system.

**COADJUTOR**, a fellow-worker, not as principal, but as second; as, the assistant of a bishop or other prelate.

**COAGULATION**, the amorphous solidification of a liquid, as when the casein of milk is solidified by rennet in making cheese, or the white of an egg by boiling. The fibrin in the blood, chyle, and lymph of animals is coagulated by the separation of these fluids from the living body.

COHUILA, a State of Mexico, separated from Texas by the Rio Grande. It has an area of 59,280 square miles, partly mountainous, and forming in the west a part of the wilderness of the Bolson de Mapimi. The climate is healthy, although extremes of heat and cold are usual. The State is rich in minerals and pasturage. Several cotton factories and a large number of flour mills are in operation. Capital, Saltillo. Population, about 145,000.

**COAL DISTRICTS.** For general article on coal, see *Britannica*, Vol. VI, pp. 45-81. In Eastern America, all the coal strata, except those of the small triassic basins of Virginia and North Carolina, are of the Carboniferous age. In Colorado, New Mexico, and on Queen Charlotte Island, excellent anthracite has been produced by volcanic heat from cretaceous lignites. In the valley of the Mississippi the coals are of the bituminous class. In the Alleghanies the coals have lost a portion of their volatile matter, and have become semi-bituminous. The coals of Blossburg, Broad Top, Frostburg, and a belt running down into Alabama belong to this group. There is in Rhode Island a coal-basin of limited extent of the same age as those of Pennsylvania; but it seems to have been nearer the focus of metamorphic action, for the coal is partially converted into graphite, forming the variety known as graphitic anthracite.

Coal areas are distributed as follows, so far as positive data are obtainable: Great Britain, 11,859 sq. miles; France, 2,000 sq. miles; Belgium, 500 sq. miles; Prussia, 2,000 sq. miles; Austria, 1,800 sq. miles; Russia, 20,000 sq. miles. The coal area of Spain is not definitely known. Her coal field in the province of Asturias is one of the most important on the continent of Europe, but as yet her coal production is small. Recent discoveries have shown that Russia has much larger coal fields than were formerly credited to her, and by some explorers it has been estimated that at least 30,000 sq. miles of territory within her confines are coal beds of different ages.

The coal area of the United States is divided into several distinct fields, to-wit: (1) The Alleghany field, reaching from the Alleghany Mountains on the west to the middle of the State of Alabama, with a computed area of 53,737 sq. miles; (2) the Illinois field, covering a large portion of the State of Illinois, and reaching into Indiana and Kentucky. Its area is estimated at 64,887 sq. miles; (3) the Missouri field, including portions of the States of Iowa, Kansas, Arkansas, Missouri and Texas, and estimated as covering 47,138 sq. miles.

The bituminous division includes the following fields: (1) the Triassic, embracing the coal beds of the Triassic or New Red Sandstone formation in the Richmond basin in Virginia, and extending into North Carolina; (2) the Appalachian field, which extends from the State of New York on the north to the State of Alabama on the south, having a length northeast and southwest of over 900 miles, and a width ranging from 30 to 180 miles; (3) the Northern field, which is confined exclusively to the central part of Michigan; (4) the Central field, embracing the coal areas in Indiana, Illinois, and Western Kentucky; (5) the Western field, including the coal areas west of the Mississippi River, south of the 43rd parallel of north latitude, and east of the Rocky Mountains; (6) the Rocky Mountain field; and, (7) the Pacific Coast field.

The total product of coal in the United States in the year 1888, as compiled from official sources, was 148,659,402 tons, having a value at the mines of \$211,518,624. During the same year (1888), 24,093 tons of anthracite, and 1,085,647 tons of bituminous

coal were imported, principally from Australia and British Columbia to San Francisco; from Great Britain to the Atlantic and Pacific coasts; and from Nova Scotia to Atlantic coast points; while there was exported 969,542 tons of anthracite, and 860,462 tons of bituminous. The exported coal went principally to the West Indies, and Central and South America.

When the anthracite tracts of Pennsylvania and Rhode Island, and the coal fields of Virginia, Michigan, and North Carolina, with the productive coal areas in the far west, are added, it will readily be seen that the coal area of the United States will largely exceed 200,000 sq. miles. Coals are primarily divided into two great groups—the hard and soft, or the anthracite and bituminous coals. Each of these groups is capable of subdivision into several varieties. The prevailing variety in the Rhode Island coal tract is the *graphitic anthracite*. It contains one or two per cent. of gaseous matter, ignites with difficulty, and forms an inferior fuel. Anthracite contains from three to ten per cent. volatile matter, and sometimes 95 per cent. of carbon, and ignites with some difficulty, but produces an intense heat. The anthracite division includes several districts whose commercial out-puts for the year 1889 (as reported by the United States census of 1890) are shown in the following table:

| Sections.                              | Long tons. | Per cent. |
|----------------------------------------|------------|-----------|
| Pennsylvania, New York, and New Jersey | 22,314,381 | 68.09     |
| New England States                     | 5,407,387  | 15.27     |
| Western States                         | 4,322,076  | 13.90     |
| Southern States                        | 1,613,120  | 4.56      |
| Pacific Coast                          | 20,900     | 0.06      |
| Canada                                 | 1,094,736  | 3.09      |
| Foreign                                | 55,190     | 0.10      |
| Total                                  | 35,407,710 | 100.00    |

**COALITION**, in politics, a term applied to the union of two parties, or, as usually happens, portions of parties, who agree to sink their differences and act in common. The English ministry known as the Great Coalition was formed in 1782, when Fox, the leader of the reformers, took office with Lord North, the leader of the opposite party. The term is also used of alliances between separate states. Of these the coalitions formed at different times by other European nations against France are among the most famous in history.

**COAL-FISH** (*Merlangus carbonarius*), a fish of the same family as the cod and haddock, and named from the color of its back. It is found in large shoals both on the European and American sides of the Atlantic. It forms an important part of the food of the Orkney and Shetland Islanders, and of the inhabitants of some of the Hebrides. The liver of the coal-fish abounds in oil, which is used for lamps.

**COAL-TAR**, or **GAS-TAR**, a thick, black, opaque liquid, which comes over and condenses in the pipes when coal or petroleum is distilled. Coal-tar is slightly heavier than water, and has a strong, disagreeable odor. As a source of benzine, and through it of the aniline dyes, coal-tar is a commodity of great commercial value.

**COALVILLE**, a thriving town of Utah, situated on the Weber River, at the base of the Wahsatch Mountains, about thirty-five miles east of Salt Lake City. It is chiefly engaged in the mining of coal for railroad and manufacturing purposes.

**COALVILLE**, a village of Leicestershire, England, 16 miles northwest of Leicester by rail. Population, 2,000.

**COAST SURVEY OF THE UNITED STATES.** In 1807, upon the recommendation of President Jef-



erson, Congress passed an act authorizing the President to cause a survey of the coasts of the United States to be made, in order to prepare accurate charts of every part of the coast; but it was not till 1817 that the work was actually begun. In that year a commencement was made near the harbor of New York, under the direction of Prof. F. R. Hassler, a native of Switzerland, who had gained experience in similar works abroad. Owing to the failure of Congress to make suitable appropriations, the work was only prosecuted at intervals between 1817 and 1832, no general survey being attempted, and the detached surveys being limited to the most elementary information.

In 1832 Congress empowered Mr. Hassler to employ such astronomers as he thought advisable to assist the military and naval officers in the prosecution of the work, and provided an appropriation adequate to the requirements of the service. From that date to the present time the survey of the coast has been in steady and active progress. Prof. Hassler continued in charge of the work until his death in 1843. His successor was Prof. A. D. Bache, who superintended operations until his death in 1867, when Prof. Benjamin Peirce, the eminent astronomer, was appointed his successor. Prof. Peirce resigned in 1874, and was succeeded by Mr. Carlile P. Patterson, formerly hydrographic inspector upon the survey. Mr. Patterson died in 1881, and was succeeded by the present superintendent, Prof. J. E. Hilgard.

Some estimate of the magnitude of the work may be formed from the fact that the American coast line, exclusive of Alaska, reaches a total of 7,060 miles, while the shore line, following the indentations of the numerous bays, etc., reaches a total of 29,375 miles. The work combines three important operations: first, the geodetic survey, which accurately determines the geographical position of various points along the coast by astronomical and trigonometrical methods; second, a topographical survey, which delineates the coast line and the characteristic features of the land; and third, a hydrographic or nautical survey of the channels, shoals, and approaches to the shore, including observations of currents and tides.

As fast as the work is completed charts are published in sheets for the use of mariners, and can be obtained at a low price at the principal sea-ports. The plan of publication embraces a main series of charts, giving a continuous representation of the entire coast on a scale of 1:80,000, or about three-quarters of an inch to a mile, and exhibiting all natural and artificial features of the shore, together with the depth of water and configuration of the sea-bottom, channels, shoals, etc.; a series of charts on a smaller scale, 1:400,000, known as "off-shore charts," for the use of mariners in approaching the coast; and a series of still more general charts on a scale of 1:1,200,000, for the use of mariners in navigating between distant points. In addition to these a large number of charts of separate harbors, bays, anchorages, rivers, passages and dangers, on scales varying from 1:5,000 to 1:60,000, are published.

Although the survey of the coast proper is now nearly completed, there still remains plenty of work to occupy the force. In 1871 Congress provided for conducting a chain of triangulation across the continent to form a geodetic connection between the Atlantic and Pacific coasts, and for the execution of the trigonometrical survey of such States as should make a requisite provision for the topographical and geological survey of their domain. This work is now being actively prosecuted, and the plan of a general geodetic

survey of the entire country bids fair to be realized.

COAMINGS, in a ship, small frame-works on the deck, to prevent sea and rain water from running down the hatchways, ladder-ways and scuttles.

COAN, Titus (1801-82), an American missionary to Hawaii. He studied theology at Auburn, N. Y., and immediately after his graduation sailed from New York for the straits of Magellan, Aug. 16, 1833. He returned to New London, Conn., in the following year, and seven months later sailed, with seven others, for the Hawaiian Islands, arriving at Hilo in the summer of 1835. Mr. Coan spent two years in the study of the language, in which he became a powerful speaker, and the number of conversions under him from 1838 to 1840 was reported as more than 7,000. He received in all up to 1882 over 13,000 into the Hilo and Puna church. In 1870 he visited the United States, but after an eleven months' stay returned to Hilo to renew his labors as a missionary. He published several works about his travels.

COAST-GUARD, a guard stationed on the coast; specifically, in Great Britain, an organization formerly intended to prevent smuggling merely, but now constituted so as to serve as a defensive force also.

COAT OF ARMS, in the Middle Ages, a coat worn by princes and great barons over their armor, and descended to the knee. It was made of cloth of gold or silver, of fur or of velvet, and bore armorial insignia. The "coat of arms" in heraldry is a relic of the ancient armorial insignia, divested of the coat on which it used to be embroidered. See *Britannica*, Vol. XI, p. 683.

COAST RANGE, a range of mountains of California, nearly parallel to the Pacific coast.

COATESVILLE, a railroad junction of Chester county, Pa., on Brandywine Creek. It has water and gas works and rolling, paper and woolen mills.

COAT OF MAIL, in the armor of the Middle Ages, a suit made of metal scales or rings, linked one within another. See *Britannica*, Vol. II, p. 556.

COATI, or COATI MONDI, a genus of carnivorous quadrupeds of the family *Procyonidae*, subfamily *Nasvinæ*. They are nearly allied to the raccoons, and like them are exclusively American. They have an elongated snout, which is a sort of flexible proboscis, and is turned, about in search of food, and employed in rooting up the earth to obtain worms and insects. See *Britannica*, Vol. XV, p. 441.

COATZACOALCO, a river of the Isthmus of Tehuantepec in Mexico. It rises in the Sierra Madre, and falls into the Gulf of Mexico 130 miles southeast of Vera Cruz. It is navigable for large vessels for 30 miles, and is interesting as part of a route which has been surveyed for an interoceanic canal.

COBB, HOWELL (1815-68), an American statesman. He was admitted to the bar in 1836, and the same year was an elector on the Van Buren ticket. In 1837 he was appointed solicitor-general of the western circuit of Georgia, and from 1843 to 1851 served by successive relections as a Democrat in Congress, becoming speaker in 1849. He was elected governor of Georgia in 1851, and two years later resumed his law practice. In 1855 he was again elected to Congress, and in 1857 became President Buchanan's Secretary of the Treasury. At the beginning of the civil war the Confederate Congress appointed him brigadier-general, and subsequently promoted him to a major-generalship. He took little part, however, in military movements.

**COBBE, FRANCES POWER**, authoress, born near Dublin, Ireland, Dec. 4, 1822. She was educated at Brighton, England, and early had her interest aroused in theological questions. She is a strong theist, a supporter of women's rights, and has taken a prominent part in the anti-vivisection crusade. She has written numerous works on religious subjects.

**COBBOLD, THOMAS SPENCER**, writer on parasitic worms, born at Ipswich, England, in 1828, died March 20, 1886. He studied medicine at Edinburgh and lectured in London on botany, zoology, comparative anatomy, geology, and helminthology, in connection with various hospitals and colleges. He wrote *Entozoa* (1864); *Parasites* (1879); and *Tapeworms* (1866); besides numerous other works on kindred subjects.

**COBET, CAREL GABRIEL**, a Dutch philologist, born in 1813. In 1847 he became professor at the University of Leyden, and in 1876 was made Foreign Associate of the French Academy of Inscriptions and Belles-lettres. Among his principal works are: *Oratio de Arte Interpretandi*, editions of the Greek classics, and writings on the comic poet Plato, Dionysius of Halicarnassus, and Xenophon.

**COBLE**, a low flat-boat with a square stern, mostly used by salmon fishers.

**COBLESKILL**, a village of Schoharie county, N. Y., on Cobleskill Creek, 45 miles west of Albany. It contains a variety of manufactories. Population, 1,122.

**COB-NUT**, a name given to some of the largest and finest cultivated varieties of the hazel-nut. In the West Indies the name is given to the fruit of *Omphalea triandra*, a tree of the natural order *Euphorbiaceæ*. The tree has a white juice, which turns black in drying, and in Guiana is used instead of ink.

**COBOURG**, a port of entry and capital of Northumberland county, Ontario, on Lake Ontario, 69 miles northeast of Toronto. It contains a Wesleyan university and several woolen mills, foundries and breweries. Population, about 5,000.

**COBURG PENINSULA**, the most northerly part of Australia, to the west of the Gulf of Carpentaria. It runs out in a northwestern direction towards Melville Island, from which it is divided by Dundas Strait.

**COCANADA**, a seaport and headquarters of Godavari district, Madras, 315 miles north of Madras. It exports cotton, oil-seeds, sugar, rice and cigars. Population, 28,856.

**COCCEIUS**, or **KOCK, JOHANNES**, a distinguished theologian, born at Bremen in 1603, died at Leyden, 1669. He studied at Hamburg and Franeker; in 1636 became professor of Hebrew there, and in 1650 of theology at Leyden. His chief work is the *Lexicon et Commentarius Sermonis Hebraici et Chaldaici Veteris Testamenti* (1669), the first tolerably complete dictionary of the Hebrew language.

**COCCEJI, HEINRICH FRIEDRICH VON**, born at Bremen in 1644, died in 1719. He studied jurisprudence and philosophy in Leyden, and in 1672 was made professor of the law of nations at Heidelberg, and the following year was appointed to a similar office at Frankfurt-on-the-Oder. His work on German civil law, *Juris publici prudentia* (1695) was almost universally used as an academical text-book for this branch of jurisprudence.

**COCCO, COCCOA ROOT**, or **EDDORS**, plants of the genus *Colocasia*, of the natural order *Araceæ*, natives of the West Indies and tropical America. The roots form the principal food of many of the inhabitants, its taste being very much like that of potatoes.

**COCCOMILLA**, or **COCUMIGLIA** (*Prunus coccumilia*), a species of plum, a native of Calabria, of which

the bark—particularly of the root—is used in that country for the cure of intermittent fevers.

**COCCOSTEUS**, a genus of fossil fishes, peculiar to the Devonian measures; about seven species have been described.

**COCCULUS INDICUS**. See *Britannica*, Vol. I, p. 172.

**COCCUS**, a genus of insects of the order *Hemiptera*, sub-order *Homoptera*, the type of a family, *Coccidæ*, allied to the *Aphis*. They are very numerous, and are attached to particular plants, on the juices of which they feed, often producing much mischief by the flow and loss of sap which their punctures occasion. This family contains some species which are of great value, particularly for the beautiful dyes which they yield. Among them are cochineal and kermes.

**COCCYX**. See *Britannica*, Vol. I, p. 821.

**COCHABAMBA**, a central department of Bolivia, with offshoots of the Eastern Cordilleras, and extensive plateaus. The climate is equable and healthy, and its fertile valleys render it the richest and most picturesque district of the Republic. Agriculture and cattle-raising are the chief occupations. Area, 26,685 square miles; population, about 355,000. The capital, Cochabamba, has a population variously estimated at from 15,000 to 40,000.

**COCHIN**, once the capital of the principality of Cochin, but now a seaport of the district of Malabar in the presidency of Madras. It is next to Bombay on this coast for ship-building and maritime commerce, the annual exports reaching a value of \$3,500,000. Population, about 16,000.

**COCHIN-CHINA**, a French province, bordered northeast by the territory of Moï, northwest Cambodia, south and east by the Chinese Sea, and by the Gulf of Siam in the west (see *Britannica*, Vol. VI, pp. 92-97). The area is 23,082 square miles, and the population is estimated at 1,858,807, of whom 2,000 are Europeans, 1,500,000 Annamites, 105,000 Cambodians, 50,000 Chinese, and 8,000 savages. French Cochin-China was incorporated with French Indo-China in 1887, and the whole divided into twenty-one arrondissements and four provinces. There are 5,660 French troops in Cochin-China, besides about 2,800 Annamite soldiers. The imports (1888) amounted to 39,392,851 francs, and the exports to 60,913,433 francs, of which 70 per cent. was rice. The annual revenue and expenditure are balanced at 30,215,943 francs in the local budget of 1888; expenditure of France (budget 1890), 6,288,718 francs.

**COCHITUATE LAKE**, of Middlesex county, Mass., a sheet of water covering 800 acres, is the chief source of the water supply of Boston.

**COCHRANE, ALEXANDER DUNDAS ROSS WISHART BAILLIE**, a British author, born in 1816, died Feb. 15, 1890. He was a member of Parliament in 1841-46; in 1847-52; in 1859-68; and in 1870-80. He succeeded to the peerage as first Baron Lamington in 1880. He was long known to society as Ballie-Cochrane, a writer of poetry and author of *Young Italy*. He recently published in Blackwood's Magazine, *In the Days of the Dandies*.

**COCKBURN, SIR ALEXANDER**, an English judge, born Dec. 24, 1802, died Nov. 20, 1880. He studied at Cambridge, was called to the bar and soon became distinguished as a pleader before Parliamentary committees. He was a member of Parliament, and later was solicitor-general, chief-justice, lord chief-justice, and was knighted.

**COCKER**, a small dog of the spaniel kind. It is trained to start game in snipe and woodcock shooting.

**COCKERILL, JOHN**, manufacturer, born in Lancashire, England, in 1790, died at Warsaw in 1840.



He was the son of William Cockerill, an inventor and machinist, who in 1807 settled at Liege in Belgium. John, with an elder brother, succeeded to his father's business in 1812, established a woolen factory in Berlin in 1815, and in 1817 founded the famous works at Seraing. His statue was erected at Seraing in 1871.

**COCK-FIGHTING**, a barbarous sport common among both the Greeks and Romans, as to-day it is common in India, the Malay countries, and Spanish America. It flourished for fully six centuries in England, the cockpit at Whitehall having been erected and patronized by royalty. It is now prohibited by statute in both England and the United States. Newspaper readers are familiar with paragraphs on cock-fights interrupted by the police. The game-fowl is the favorite breed of fighting-cocks, and much art is displayed in the training of cocks, and in trimming and preparing the cock for the combat. Young cocks are called stags, and are considered at their best when two years of age, and from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  lbs. in weight. When prepared for battle their natural spurs are usually reinforced by steel spurs from two to three inches in length.

**COCK-LANE GHOST**, a reported apparition which was said to have appeared in the year 1762 in the house of one Mr. Parsons, in Cock Lane, Smithfield, England, and caused extraordinary excitement in London. Strange and unaccountable noises were heard in the house, and a luminous figure, bearing a strong resemblance to a lady who, under the name of Mrs. Kent, had once resided in the house, but who had died two years before, was said to have been seen; and dark suspicions as to Mr. Kent having poisoned the lady were immediately aroused. Crowds were attracted to the house and most of them became believers, but a few skeptics instituted a careful investigation, and discovered that Parsons's daughter, a girl eleven years of age, had personated the ghost. Parsons was prosecuted, and condemned to stand three on the pillory for imposture and fraud.

**COCKNEY**, originally a child delicately nurtured, and hence applied to the citizens of luxurious towns, as opposed to the harder inhabitants of the country. London has been famed for its luxury from the earliest times, and its inhabitants have now appropriated the name of Cockneys.

**COCK OF THE PLAINS** (*Centrocercus urophasianus*), the largest of the North American species of grouse. It is an inhabitant of the interior of California, living in flocks, and often feeding so much on species of *Artemisia* that its flesh is almost too bitter to be eaten.

**COCK OF THE ROCK** (*Rupicola*), a genus of South American passerine birds in the family of *Cotingidae*, or chattering. The male is remarkable for a lofty, laterally compressed crest; the bill is high and strong, the tail short and straight. In the best-known species, *R. crocea*, from Guiana and the northeast of Brazil, the male is predominantly orange-red in color, with a dark crest, and is considerably larger than the sober brown female. It is about the size of a common pigeon.

**COCKPIT**, a name given in a ship of war to the compartment in the lower part of the ship where the wounded are attended to during action. The surgery and dispensary which contains the medicine chests for the ship's company adjoin the cockpit.

**COCKSCOMB**, an annual plant of the natural order *Amarantaceæ*, a native of the East Indies. By gardeners the name is confined to *Celosia cristata*. It grows with an upright stem, which becomes flattened upwards, expands and forms a wavy crest. The colors are various and often very brilliant.

**COCK'S-FOOT GRASS** (*Dactylis*), a genus of grasses, called cock's-foot from the dense branches of the one-sided panicles. *D. glomerata* is a native of Europe, Asia, North America and the North of Africa. It is valuable for hay, and forms an important part in almost all the best pastures, as it is much relished by cattle. It thrives on most kinds of soil, and in situations too shady for many other grasses. It is extensively cultivated in America.

**COCKSWAIN**, or **COXWAIN**: on board ship, the steersman of a boat, and commander of the boat's crew.

**COCOA-NUT BEETLE**, a large beetle of the family *Longicornes*, tribe *Lamiaræ*, the larvæ of which are very destructive in cocoa-nut plantations, eating their way in all directions in the stems of the younger trees.

**COCOON**, the silken sheath spun by the larvæ of many insects in passing into the pupa or resting stage. The arrangement of the threads, and the completeness of the covering vary widely. The most typical and perfect cocoons are those of many moths, especially those of the silkworm. The delicacy, neatness and labor exhibited by these last make them as marvelous as they are useful.

**COD**. See *Britannica*, Vol. VI, pp. 103-04.

**CODA**, in music, a passage added to a composition, for establishing more completely the final cadence. It may be compared to the peroration of an oratorical discourse.

**CODE**. See *Britannica*, Vol. VI, pp. 104-07.

**CODEINE**, an opium alkaloid obtained from poppy-heads. It is a white crystalline substance, similar to morphine, but much feebler in its action.

**CODEX**, a name applied to ancient manuscripts, especially of the classics or of the Scriptures. Of the latter class the principal are the *Codex Sinaiticus*, discovered in 1844 and 1859 in the monastery of Mount Sinai by Tischendorf, and the *Codex Vaticanus*, both of the 4th century; and the *Codex Alexandrinus* and *Codex Ephraemi* of the 5th century. See *Britannica*, Vol. XVIII, pp. 143-44.

**CODICIL**, a supplement to a will whereby anything omitted is added, or any change demanded by the altered circumstances of the testator. A codicil is authenticated in the same manner as a will, and possesses the same privileges when holograph or written by the hand of the testator himself.

**CODLIN MOTH** (*Carpocapsa pomonella*), a small moth, which is very injurious in apple orchards, laying its eggs in the calyx-end of the newly formed fruit, within which the larva feeds, so that the growth of the fruit is arrested and it falls off prematurely.

**CODRINGTON**, SIR WILLIAM JOHN, G. C. B., (1804-84), an English general, son of the British admiral, Sir Edward Codrington. Sir William was commander-in-chief in the Crimea in 1855.

**CELE-SYRIA**, or **EL-BUKAA**, a valley of Syria extending between the ranges of the Lebanon and Anti-Lebanon, at an elevation of 2,300 feet above the sea. It is 70 miles in length and seven in breadth. In this valley stand the ruins of Baalbek and Chalcis.

**COERCION**. See *Britannica*, Vol. VII, p. 608; and Vol. XIX, pp. 670-71.

**CEREBIDÆ**, a family of oscine passerine birds found in the warmer parts of America. They are small, and of brilliant and varied colors.

**COEYMANS**, a small railroad town of Albany county, N. Y. Soap, straw-paper and brooms are manufactured. There are flagstone quarries here, and also a mineral spring.

**COFFEE-BUG** (*Lecanium coffeæ*), an insect of the Coccid family, which lives on the coffee-tree, and is extremely destructive to coffee plantations.

**COFFEE TREE**, or **KENTUCKY COFFEE**, a leguminous tree of the United States, often growing to a large size, the seeds of which have been sometimes used as a substitute for coffee.

**COFFER**, a box or casket for keeping jewels, money or other valuables. Coffers and chests were sometimes made of iron, but more frequently of wood.

**COFFER-FISH**, a fish of the genus *Ostracion*. The body is inclosed in a firm case formed of hexagonal bony scales fitted into one another like a mosaic. The snout, the bases of the fins, and the end of the tail are the only soft-skinned parts. Over a score of species are known, from tropical and subtropical seas. The best-known form is *O. quadricornis* from the tropical Atlantic.

**COFFEYVILLE**, a railway city of Kansas, and shipping point for the Cherokee Nation. It is in Montgomery county, on the Verdigris River.

**COFFIN**, SIR ISAAC, a British admiral, born in Boston, Mass., in 1759, died in 1839. He entered the navy in 1773, and served against the Americans during their struggle for liberty. After the war he visited his native land and endowed the Coffin School at Nantucket.

**COGGESHALL**, a town in the county of Essex, England, situated on the Blackwater, 44 miles northeast of London. It has manufactories of silk, velvet and lace. Population, 2,916.

**COGALNICEANU**, MICHAEL, a Roumanian statesman, born in 1806. At an early age he became professor of national history at Jassy. In 1864 he was president of the cabinet, and from 1868 to 1870 was again a member of the cabinet, as minister of internal affairs. In 1876 he was made minister of foreign affairs; later ambassador to France, and in 1879 he became senator. He has written several valuable histories.

**COGNIZANCE**, a term used in heraldry, sometimes to signify a crest, sometimes a badge, or other distinguishing mark.

**COGNOSCENTI**, persons professing a critical knowledge of works of art, and of a somewhat more pretentious character than amateurs.

**COGNOVIT**, in law, is the defendant's written confession that the plaintiff's cause against him is just and true.

**COHABITATION**, the state of living together as husband and wife, and being reputed to be such. These circumstances are held to afford sufficient proof that the contract of marriage has been constituted by their mutual consent.

**CO-HEIR** and **CO-HEIRESS**, one of two or more persons among whom an inheritance is divided.

**COHN**, FERDINAND JULIUS, a German botanist, born in 1828. In 1850 he became privatdocent, and in 1870 professor of botany in the Breslau University. He has written many popular works on botany.

**COHNHEIM**, JULIUS FRIEDRICH, a German pathologist, born in 1839. He practiced medicine for a while, and in 1864 became connected with the Berlin Charity Hospital. In 1868 he became professor of pathology in the University of Kiel; in 1872 at Breslau, and in 1878 at Leipsic. He has made many important discoveries in pathology, and has written several books on this subject.

**COHORT**, in the ancient Roman armies, a portion of a legion, consisting usually of 600 men. There were generally 10 cohorts to a legion.

**COHOSH**, the Indian name of a number of plants used in medicine, the principal of which are *Cimicifuga racemosa*, *Actæa alba* and *spicata*, and *Caulophyllum thalictroides*.

**CÔHUNE OIL**, a fixed oil obtained from the kernel of the fruit of *Attalea Cohune*, a palm abun-

ant in Honduras and on the Isthmus of Panama. The leaves are 30 feet in length, and each leaflet measures three feet, while the tree attains a height of only about 40 feet.

**COLF** a covering for the head in general, but more especially for the circular portion on the crown. Its special signification is now limited to the caul or cap worn by sergeants-at-law.

**COIMBATORE**, the capital of a district of Madras presidency, on the Noyil, 304 miles southwest of Madras by rail. It is elevated 1,437 feet above the level of the sea, and has a cool temperature, rendering it a desirable place of residence for Europeans. Population in 1881, 38,967. See Britannica, Vol. VI, p. 116.

**COINCIDENCE**. When two geometrical figures are laid upon one another, and the boundaries of the one falls everywhere exactly upon those of the other, the figures are said to coincide. See CONGRUITY, in these Revisions and Additions.

**COKE**. See BRITANNICA, Vol. VI, pp. 118-19.

**COKE**, THOMAS, D. C. L. (1747-1814), first bishop of the Methodist Episcopal church, was born at Brecon in Wales, in 1747, graduated at Oxford in 1768, and settled as a curate in Somersetshire, England. Being dismissed by his rector for open-air preaching and holding cottage services, he joined the Methodists, and served as president of the English and Irish conferences in 1782, 1797, and 1805. In 1784 he arrived in New York, having been set apart by Wesley as "superintendent" of the societies in America. He made nine voyages to this country, and died on the Indian Ocean while on a missionary voyage to Ceylon in 1814, having devoted his life to the cause of Methodist foreign missions.

**COL**, a depression or pass in a mountain-range. In those parts of the Alps where the French language prevails the passes are usually named *cols*, as the *Col-de-Balmé*, the *Col-du-Geant*, etc.

**COL'ARCO**: in music, with the bow, in contradistinction to *pizzicato*.

**COLBAN**, MARIE SOPHIE, a Norwegian novelist, born in 1814. She visited Paris, and was employed by a journal there to go to Rome as Italian correspondent. She has written various novels.

**COLBURN**, ZERAH (1804-40), an American mathematical prodigy. At a very early age he was exhibited in America, England, Scotland, Ireland, and France, mentally solving intricate problems with great facility. At the age of nine he was able to answer immediately questions like "What is 999,999<sup>2</sup> x 49<sup>2</sup> x 25?" In 1820 he became a teacher in London, performing astronomical calculations at the same time for Dr. Thomas Young, then secretary of the board of longitude. In 1825 he united with the Methodist church; was for nine years an itinerant preacher. In 1855 he became professor of languages in Norwich University, Vt., which position he held till his death. His remarkable faculty disappeared as he grew to manhood.

**COLBY UNIVERSITY**. See COLLEGES, in these Revisions and Additions.

**COLCHESTER**, a manufacturing town of New London county, Conn. Bacon Academy is here. Paper and India-rubber goods are manufactured.

**COLCHICUM**, a genus of the natural order *Liliaceæ*, sub-order *Melanthaceæ*. The species are stemless, with flowers half subterranean, the limb of the perianth and part of the tube only rising above ground. The superior ovary rises after the flowering is over in the form of three little follicles slightly adhering to each other on a lengthened stalk. It is a valuable medicinal plant, the parus chiefly used for medicinal purposes being the corns and the seeds.



**COLCOTHAR**, a name given by the alchemists to the brownish, red peroxide of iron which remains in the retorts when green vitriol or the sulphate of iron is calcined. As a pigment it is known as *Indian red*. The powder is used for polishing glass and the like.

**COLD**. See *Britannica*, Vol. V, pp. 218-19.

**COLD CREAM**, a preparation of fatty substances used as a mild dressing for the skin, usually made of olive oil, white wax and rose water.

**COLDEN**, CADWALLADER (1688-1776), a Scottish-American physician. After studying medicine and mathematics in Europe, he came to the United States in 1708, and practiced in Philadelphia till 1715, when he revisited London. He settled in New York city in 1718, and the following year became surveyor-general of the colony and master in chancery. In 1755 he retired to a tract of land about nine miles from Newburgh on the Hudson, where he gave his attention to farming and scientific pursuits. He administered the affairs of the province as president of the council in 1760, and the following year he was appointed lieutenant-governor of New York. He held this position till his death, and was many times at the head of affairs through the absence or death of the various governors.

**COLDEN**, CADWALLADER DAVID (1769-1834), an American lawyer. In 1818 he was elected mayor of New York city; in 1820 was sent to Congress, and in 1824 to the State senate. He wrote a *Life of Robert Fulton*.

**COLD HARBOR**, a location in Hanover county, Va., 10 miles northeast of Richmond. Here in May and June of 1864 the Confederate and Union armies confronted each other and a series of engagements took place.

**COLD-PIT**, in gardening a simple contrivance for the preservation of half-hardy plants through the winter. It consists of a pit, about 3 ft. in depth, covered with a frame either thatched or glazed.

**COLD SPRING**, a village of New York, situated on Long Island, on an inlet of the Sound, about thirty miles east of New York city. It contains a very successful artificial hatchery belonging to the United States Fish Commission. It was formerly an important whaling port.

**COLD SPRING**, a village of Putnam county, N. Y., situated among the Highlands on the east bank of the Hudson, one mile from West Point. Cannon, brass castings and machinery are here manufactured.

**COLDSTREAM GUARDS**, a celebrated regiment in the Foot Guards of the British army, its organization dating from an earlier period than that of any other regiment excepting the 1st Foot. Raised in 1660 by Gen. Monk at Coldstream, it was at first called Monk's Regiment; but when Parliament gave a brigade of guards to Charles II, this corps was included in it, and the name was changed to Coldstream Guards.

**COLDWATER**, a town in Michigan, capital of Branch county, on the Lake Shore Railway, 156 miles east of Chicago. It has numerous manufacturing, and a public school building which cost \$100,000.

**COLE**, SIR HENRY, English civil administrator and author, born at Bath, July 15, 1808, died April 18, 1882. He was educated at Christ's Hospital. He became assistant keeper of the records in 1838; was chairman of the Society of Arts; did valuable service on the committee of the Exhibition of 1851; was the founder of South Kensington Museum, and in 1860 became director of that institution. For his service on innumerable committees and councils, and in promoting valuable reforms, he was

made K. C. B. in 1875. He wrote much for newspapers and reviews, and under the name of "Felix Summerly," published a number of books for children.

**COLE**, THOMAS, an American landscape painter, born at Bolton-le-Moors in 1801, died Feb. 11, 1848. He removed to America in 1819. In 1830 two of his pictures appeared in the Royal Academy, and he afterwards made sketching tours through England, France and Italy; but all his best landscapes were from American subjects.

**COLE**, VICAR, R. A., an English landscape painter, born at Portsmouth in 1833, and received early artistic instruction from his father. His paintings were first exhibited in 1852, and six years later he was elected member of the Society of British Artists. His picture entitled *A Surrey Cornfield* greatly increased his reputation. Mr. Cole became an Associate of the Royal Academy in 1870, and was elected R. A. in 1880.

**COLEBROOKE**, or GREAT FALLS, a village of New Brunswick, and a port of entry, situated near the Great Falls of the St. John River, which is here crossed by a fine suspension bridge.

**COLEMAN**, LYMAN (1796-1882), an American author. He was a tutor in Yale College from 1820 to 1825, studying theology at the same time. He preached for seven years in the Congregational church, and for five years was principal of Burr Seminary in Vermont, and later principal of the English department of Phillips Andover Academy. After a visit to Germany he taught German in Princeton College, and later in Amherst. He traveled in Europe, Egypt, and Palestine in 1856, and on his return to America taught Latin and Greek in Lafayette College, Easton, Pa. Prof. Coleman's publications were principally on Biblical subjects.

**COLENSO**, JOHN WILLIAM (1814-83), an English colonial bishop of Natal. In 1846 he became rector of Forncett St. Mary, Norfolk, and in 1854 was elected bishop of Natal. He published extensively on mathematical, religious and other topics. See *Britannica*, Vol. XVII, p. 242; Vol. XVIII, p. 512.

**COLEPEPER**, JOHN, a British statesman, a native of Sussex, England, but little is known of his history until his return for Kent in 1640 to the Long Parliament. In 1642 he became chancellor of the exchequer, a twelvemonth later master of the rolls, and in another twelvemonth Lord Colepeper. He died June 11, 1660.

**COLERIDGE**, DERWENT (1800-83), an English clergyman. In 1841 he became principal of St. Mark's College, Chelsea. While holding this position he was a prebendary of St. Paul's Cathedral and later rector of Homwell, Middlesex. He published some works of a religious character.

**COLERIDGE**, JOHN DUKE, baron, an English jurist, born in 1821. In 1855 he became recorder of Portsmouth, and in 1861 was made Queen's counsel. From 1865 to 1873 he was a member of Parliament. In 1871 he became attorney-general, and in 1873 chief justice of the court of common pleas. In 1880 he was made lord chief justice of England.

**COLEROON**, a river of Southern India. See *KAVENS*, *Britannica*, Vol. XIV, p. 19.

**COLES**, EDWARD (1786-1868), a governor of Illinois. He was private secretary to President Madison for six years from 1810, and in 1817 went to Russia on a diplomatic mission. On his return he was appointed registrar of the United States land office at Edwardsville, Ill., and was governor of the State from 1823 to 1826, during his term of office preventing the pro-slavery party from obtaining control of the State.

**COLEUS.** See *Britannica*, Vol. XII, p. 266.

**COLEWORT**, a name given to some of the many cultivated varieties of *Brassica oleracea*. The name is also applied to cabbages cut for use before their leaves have fully closed into heads.

**COLFAX, SCHUYLER**, an American statesman, born in New York city, March 23, 1823, died Jan. 13, 1885. In 1836 he removed and settled with the family in Indiana. In 1841 he was made deputy to his stepfather, George W. Matthews, who was county auditor. Colfax held this position for eight years. He was for several years editor of the "South Bend Free Press and Register," the most influential Whig journal in Northern Indiana. In 1848 he was secretary of the Whig convention in Baltimore which nominated Taylor for President. The next year he was a member of the convention to revise the constitution of the State of Indiana, and earnestly opposed a clause to prohibit free colored men from settling in that State. He was again a delegate to the Whig national convention in 1852, and having joined the new Republican party, was elected to Congress in 1854, and continued in that office until 1869. In December, 1863, he was elected Speaker of the House, and twice reelected as Speaker. In May, 1868, at the Chicago National Republican Convention he was nominated for Vice-President of the United States, and in November was elected, taking his seat as President of the Senate March 4, 1869. In 1871 President Grant offered him the place of Secretary of State, but he declined in order to serve out his term as Vice-President. His later years were spent chiefly in retirement from active politics, but, yielding to popular demand, he made several successful tours in the lecture field. At his death public honors were awarded to his memory, both in Congress and in several of the States.

**COLFAX**, a flourishing town, county-seat of Whitman county, Wash. It is the trade-center of an extensive and fertile agricultural district.

**COLIC**, a name employed by the later Greek and Roman physicians to denote diseases attended with severe pain and flatulent distension of the abdomen, without diarrhoea or looseness of the bowels. The disease is now generally believed to be spasmodic in character, and to be dependent upon irregular contractions of the muscular coat of the intestines. It is usually attended with constipation, and ceases when the regular action of the bowels is restored, although often in this case the operation of medicine is attended by continued pain for a time. It is closely allied as a symptom to several very severe and dangerous diseases, such as peritonitis, lead poisoning, etc.

**COLL**, one of the western isles of Scotland, off the west coast of Mull, two and a half miles north-east of Tiree Isle. It is 12 miles in length. Population 723; engaged in agriculture and fishing.

**COLLATERAL SECURITY**, any property or right of action, as a bill of sale or stock-certificate, which is given as additional security for the performance of an obligation, and is to be surrendered upon the performance of the latter.

**COLLAR-BEAM**, a piece of timber connecting a pair of rafters. Large roofs have two or more collar-beams.

**COLLE**, a town of Italy, on the Elsa, 24 miles southwest of Florence. It has an old cathedral and castle. Population, 5,090.

**COLLECT**, a short form of prayer, consisting of a single sentence, conveying one main petition, which is based on an attribute ascribed to God in the opening invocation, and closes with an ascription of praise or a pleading of the merits of Christ.

**COLLEGE COLORS.** The following is a list of the colors chosen and in use by the principal colleges of the United States compiled from reports made by the institutions named up to Jan. 1, 1891:

|                                        |                                 |
|----------------------------------------|---------------------------------|
| Alfred College.....                    | Purple and Gold.                |
| Amherst College.....                   | Violet and White.               |
| Barzary College.....                   | Blue and White.                 |
| Bates College.....                     | Garnet.                         |
| Boston University.....                 | Crimson and White.              |
| Bowdoin College.....                   | White.                          |
| Brown University.....                  | Brown.                          |
| Carleton College.....                  | Maize.                          |
| Colgate University.....                | Maroon and Yellow.              |
| Coll. City of New York.....            | Lavender.                       |
| Columbia College.....                  | Blue and White.                 |
| Columbian University.....              | Orange and Blue.                |
| Cornell College.....                   | Royal Purple.                   |
| Cornell University.....                | Cornelian and White.            |
| Cumberland University.....             | Blue, Green and White.          |
| Davidson College.....                  | Pink and Blue.                  |
| DePauw University.....                 | Old Gold.                       |
| Dickinson College.....                 | Red and White.                  |
| Franklin and Marshall College.....     | Blue and White.                 |
| Franklin College.....                  | Blue and Orange.                |
| Furman University.....                 | Purple and White.               |
| Georgetown College.....                | Blue and Gray.                  |
| Hamilton College.....                  | Rose Pink.                      |
| Harvard University.....                | Crimson.                        |
| Haverford College.....                 | Scarlet and Black.              |
| Hiram College.....                     | Bright Red and Sky Blue.        |
| Hobart College.....                    | Orange and Royal Purple.        |
| Illinois Wesleyan.....                 | Steel Gray and Navy Blue.       |
| Indiana University.....                | Maroon.                         |
| Iowa State University.....             | Old Gold.                       |
| Johns Hopkins University.....          | Black and Blue.                 |
| Kentucky University.....               | Orange and Blue.                |
| Kenyon College.....                    | Maize.                          |
| Knox College.....                      | Old Gold and Royal Purple.      |
| Lafayette College.....                 | Maroon and White.               |
| Lake Forest University.....            | Pink and Blue.                  |
| Lehigh University.....                 | Brown and White.                |
| Manhattan College.....                 | Blue and White.                 |
| Marietta College.....                  | United States Flag.             |
| Miami University.....                  | Scarlet and White.              |
| Middlebury College.....                | Blue.                           |
| Mumouth College.....                   | Red and White.                  |
| Mt. St. Mary's College.....            | White and Blue.                 |
| Muhlenberg College.....                | Garnet and Steel.               |
| Northwestern University.....           | Purple and Gold.                |
| Norwich University.....                | Gold and Garnet.                |
| Notre Dame College.....                | Blue and Old Gold.              |
| Oberlin College.....                   | Red and Gold.                   |
| Ohio State University.....             | Red and Gray.                   |
| Ohio Wesleyan College.....             | Scarlet and Jet.                |
| Olivet College.....                    | Crimson.                        |
| Pennsylvania College.....              | Orange and Navy Blue.           |
| Polytechnic Institute of Brooklyn..... | Blue.                           |
| Princeton College.....                 | Orange and Black.               |
| Randolph Macon College.....            | Orange and Black.               |
| Rollins College.....                   | Rose Pink.                      |
| Rutgers College.....                   | Scarlet.                        |
| Seton Hall College.....                | Blue and White.                 |
| Smith College.....                     | White.                          |
| Stevens Inst. Technology.....          | Silver, Gray and Cardinal Red.  |
| St. Francis Xavier College.....        | Red and Blue.                   |
| St. John's College.....                | Light Blue and White.           |
| St. Lawrence University.....           | Scarlet and Brown.              |
| St. Louis University.....              | Orange, White and Blue.         |
| St. Stephen's College.....             | Blue.                           |
| Swarthmore College.....                | Garnet.                         |
| Syracuse University.....               | Orange.                         |
| Trinity College (Hartford).....        | Old Gold and Blue.              |
| Trinity College (N.C.).....            | Blue.                           |
| Tufts College.....                     | Brown and Blue.                 |
| Tulane University.....                 | Old Gold.                       |
| Union College.....                     | Garnet.                         |
| University of California.....          | Blue and Gold.                  |
| University of Denver.....              | Garnet and Gold.                |
| University of Georgia.....             | Crimson, Black and Old Gold.    |
| University of Kansas.....              | Blue and Buff.                  |
| University of Michigan.....            | Maize and Blue.                 |
| University of Minnesota.....           | Old Gold and Maroon.            |
| University of Missouri.....            | Old Gold and Black.             |
| University of Nebraska.....            | Old Gold.                       |
| University of North Carolina.....      | White and Blue.                 |
| University of Pennsylvania.....        | Red and White.                  |
| University of Rochester.....           | Blue and Steel Gray.            |
| University of South Carolina.....      | Tea Green and Cardinal Red.     |
| University of City of New York.....    | Violet.                         |
| University of the South.....           | Purple and Gold.                |
| University of Tennessee.....           | Blue and Gray.                  |
| University of Texas.....               | White, Heliotrope and Old Gold. |
| University of Vermont.....             | Straw and Dark Green.           |
| University of Virginia.....            | Dark Blue and Orange.           |
| University of Wisconsin.....           | Red.                            |



|                                            |                      |
|--------------------------------------------|----------------------|
| University of Wooster.....                 | Old Gold and Black.  |
| Vanderbilt University.....                 | Yellow and Black.    |
| Vassar College.....                        | Pink and Gray.       |
| Wabash College.....                        | Scarlet.             |
| Wake Forest College.....                   | Blue and Red.        |
| Washington and Jefferson Col-<br>lege..... | Black and Carmine    |
| Washington and Lee Univer-<br>sity.....    | White and Blue.      |
| Washington University.....                 | Green and Red.       |
| Wellesley College.....                     | Blue.                |
| Wells College.....                         | Green and White.     |
| Wesleyan University (Conn.).....           | Cardinal and Black.  |
| Western Reserve University.....            | Crimson and White.   |
| Westminster College.....                   | Dark Blue and White. |
| William and Mary College.....              | Orange and White.    |
| Williams College.....                      | Royal Purple.        |
| Yale University.....                       | Dark Blue.           |

COLLEGES AND UNIVERSITIES IN UNITED STATES AND CANADA. For the general subject of Colleges and Universities in various countries, with elaborate earlier statistics of such institutions, see *Britannica*, Vol. VI, pp. 142-43, and Vol. XIII, pp. 831-38. The subjoined list embraces the names of the principal literary and theological institutions of this class in the United States and in the Dominion of Canada, together with the dates of their organization, the places where they are located, their relation to religious denominational control, the names of their presidents severally on Jan. 1, 1891, and the numbers of their teachers and students, and also the numbers of volumes in their respective libraries:

| Organized. | Name.                       | Location.               | Denomi-<br>national Con-<br>trol. | President or Chairman of<br>Faculty. | Instructors.* | Students.* | Volumes in<br>Library. |
|------------|-----------------------------|-------------------------|-----------------------------------|--------------------------------------|---------------|------------|------------------------|
| 1857       | Alfred College.....         | Alfred Centre, N. Y.... | Non-Sect....                      | J. Allen, D.D., LL.D....             | 20            | 349        | 7,713                  |
| 1815       | Allegheny College.....      | Meadville, Pa.....      | Meth. Epis....                    | D. H. Wheeler, D.D., LL.D....        | 16            | 293        | 12,500                 |
| 1821       | Amherst College.....        | Amherst, Mass.....      | Non-Sect....                      | M. E. Gates, LL.D., L.H.D....        | 28            | 356        | 54,000                 |
| 1807       | Andover Theol. Sem.....     | Andover, Mass.....      | Cong.....                         | Egbert O. Smyth, D.D....             | 12            | 62         | 47,000                 |
| 1852       | Antioch College.....        | Yellow Springs, O.....  | Non-Sect....                      | Daniel A. Long, D.D., LL.D....       | 14            | 100        | 7,000                  |
| 1867       | Atlanta University.....     | Atlanta, Ga.....        | Non-Sect....                      | Rev. H. Burmeister, D.D....          | 38            | 677        | 7,000                  |
| 1889       | Barnard College (41).....   | New York City.....      | Non-Sect....                      | A. Brooks, A. M. (Ch. Fac.)....      | 16            | 46         | 125                    |
| 1863       | Bates College.....          | Lewiston, Me.....       | Free Bapt....                     | Oren B. Cheney, D.D....              | 13            | 166        | 10,373                 |
| 1858       | Berea College.....          | Berea, Ky.....          | Non-Sect....                      | Wm. B. Stewart, A.M., D.D....        | 17            | 355        | 4,600                  |
| 1869       | Boston University.....      | Boston, Mass.....       | Meth. Epis....                    | Wm. F. Warren, D.D., LL.D....        | 118           | 928        | 15,000                 |
| 1794       | Bowdoin College.....        | Brunswick, Me.....      | Cong.....                         | Wm. DeWitt Hyde, D.D....             | 27            | 267        | 46,400                 |
| 1764       | Brown University.....       | Providence, R. I.....   | Baptist (2)....                   | E. B. Andrews, D.D., LL.D....        | 30            | 325        | 70,000                 |
| 1885       | Bryn-Mawr College.....      | Bryn-Mawr, Pa.....      | Or. Friends....                   | James E. Rhoads, LL.D....            | 25            | 130        | 8,000                  |
| 1870       | Canisius College.....       | Buffalo, N. Y.....      | R. Catholic....                   | Rev. J. U. Heinzel, S. J....         | 24            | 335        | 14,400                 |
| 1870       | Carleton College.....       | Northfield, Minn....    | Cong.....                         | Rev. James W. Strong, D.D....        | 23            | 297        | 9,850                  |
| 1881       | Case Sc. App'l Science..... | Cleveland, O.....       | Non-Sect....                      | Cady Staley, Ph.D., LL.D....         | 11            | 100        |                        |
| 1889       | Catholic Univ. Amer.....    | Washington, D. C....    | R. Catholic....                   | Rev. J. J. Keane, D.D. (c)....       | 16            | 33         | 15,000                 |
| 1785       | Charleston College.....     | Charleston, S. C....    | Non-Sect....                      | H. E. Shepherd, A.M., LL.D....       | 6             | 45         | 12,000                 |
| 1888       | Clark University.....       | Worcester, Mass.....    | A. M. Ph.D., LL.D....             | G. S. Hall, A. M., Ph.D., LL.D....   | 24            | 648        | 9,000                  |
| 1820       | Colby University.....       | Waterville, Me.....     | Baptist.....                      | Albion W. Small, Ph.D....            | 12            | 170        | 26,000                 |
| 1819       | Colgate University (d)..... | Hamilton, N. Y.....     | Baptist.....                      | Vacant.....                          | 15            | 138        | 19,000                 |
| 1847       | Coll. City of N. Y.....     | New York City.....      | Non-Sect....                      | Alex. Stewart Webb, LL.D....         | 43            | 1,121      | 25,889                 |
| 1764       | Columbia College.....       | New York City.....      | Non-Sect....                      | Seth Low, LL.D....                   | 103           | 1,656      | 115,700                |
| 1821       | Columbian Univ.....         | Washington, D. C....    | Non-Sect....                      | James C. Welling, LL.D....           | 57            | 776        | 10,000                 |
| 1837       | Cornell College.....        | Mt. Vernon, Ia.....     | Meth. Epis....                    | Wm. F. King, D.D., LL.D....          | 60            | 1,028      | 12,000                 |
| 1868       | Cornell University.....     | Ithaca, N. Y.....       | Non-Sect....                      | Chas. Kendall Adams, LL.D....        | 121           | 1,850      | 108,138                |
| 1842       | Cumberland Univ.....        | Lebanon, Tenn.....      | C'mb. Presb....                   | Nathan Green, LL.D. (Chan.)....      | 14            | 312        | 7,000                  |
| 1769       | Dartmouth College.....      | Hanover, N. H.....      | Cong.....                         | S. C. Bartlett, D.D., LL.D....       | 48            | 455        | 72,000                 |
| 1837       | Davidson College.....       | Davidson, N. C....      | Presb.....                        | J. B. Shearer, D.D., LL.D....        | 8             | 111        | 9,000                  |
| 1832       | Denison University.....     | Granville, O.....       | Baptist.....                      | Gal. Anderson, D.D., LL.D....        | 12            | 172        | 15,000                 |
| 1857       | De Pauw University.....     | Greencastle, Ind.....   | Meth. Epis....                    | John P. D. John, D.D....             | 10            | 1,028      | 12,000                 |
| 1783       | Dickinson College.....      | Carlisle, Pa.....       | Methodist....                     | George E. Reed, D.D., LL.D....       | 14            | 240        | 32,000                 |
| 1867       | Drew Theolog. Sem.....      | Madison, N. J.....      | Meth. Epis....                    | Henry A. Buttz, D.D., LL.D....       | 6             | 125        | 35,000                 |
| 1857       | Eminence College.....       | Eminence, Ky.....       | Non-Sect....                      | W. S. Giltner, A.M....               | 8             | 93         | 2,000                  |
| 1837       | Emory College.....          | Oxford, Ga.....         | Meth. Ep. S....                   | W. A. Candler, D.D....               | 13            | 253        | 7,000                  |
| 1839       | Erskine College.....        | Due West, S. C....      | A. R. Presb....                   | W. M. Grier, D.D....                 | 6             | 82         | 7,000                  |
| 1867       | Fisk University.....        | Nashville, Tenn....     | Cong.....                         | E. M. Cravath, D.D....               | 11            | 259        | 4,011                  |
| 1834       | Franklin College.....       | Franklin, Ind.....      | Baptist.....                      | W. T. Stott, D.D....                 | 11            | 528        | 6,500                  |
| 1852       | Franklin and Marshall.....  | Lancaster, Pa.....      | Ref. Germ....                     | Rev. John S. Stahr, Ph.D....         | 15            | 201        | 26,000                 |
| 1851       | Furman University.....      | Greenville, S. C....    | Baptist.....                      | Charles Manly, D.D....               | 8             | 166        | 2,500                  |
| 1817       | General Theol. Sem.....     | New York City.....      | Prot. Epis....                    | E. A. Hoffman, D.D., D.C.L....       | 10            | 116        | 20,242                 |
| 1789       | Georgetown College.....     | Georgetown, D. C....    | R. Catholic....                   | J. Havens Richards, S. J....         | 69            | 550        | 45,000                 |
| 1812       | Hamilton College.....       | Clinton, N. Y.....      | Presb.....                        | Henry Darling, D.D., LL.D....        | 14            | 168        | 35,000                 |
| 1776       | Hampden Wesleyan.....       | Hampden, Sidney, Va.    | Non-Sect....                      | Rich. M. Frawley, D.D....            | 10            | 833        | 15,700                 |
| 1828       | Hanover College.....        | Hanover, Ind.....       | Presb.....                        | D. W. Fisher, D.D., LL.D....         | 14            | 160        | 10,000                 |
| 1836       | Harvard University.....     | Cambridge, Mass....     | Non-Sect....                      | Chas. Wm. Eliot, LL.D....            | 242           | 2,271      | 376,200                |
| 1832       | Haverford College.....      | Haverford, Pa.....      | Friends.....                      | Isaac Sharpless, Sc.D., LL.D....     | 15            | 101        | 25,000                 |
| 1867       | Hiram College.....          | Hiram, O.....           | Disciples....                     | E. V. Zollars, A.M....               | 13            | 260        | 4,000                  |
| 1822       | Hobart College.....         | Geneva, N. Y.....       | Prot. Epis....                    | E. N. Potter, S.T.D., LL.D....       | 16            | 24,319     |                        |
| 1867       | Howard University.....      | Washington, D. C....    | Non-Sect....                      | J. E. Rankin, D.D., LL.D....         | 55            | 400        | 10,000                 |
| 1838       | Illinois Wesleyan.....      | Bloomington, Ill....    | Meth. Epis....                    | H. W. Wilder, M.A., D.D....          | 21            | 917        | 3,500                  |
| 1820       | Indiana University.....     | Bloomington, Ind....    | Non-Sect....                      | D. S. Jordan, Ph.D., LL.D....        | 25            | 380        | 15,000                 |
| 1846       | Iowa College.....           | Grinnell, Ia.....       | Cong.....                         | Rev. George A. Gates.....            | 26            | 588        | 15,100                 |
| 1847       | Iowa State Univ. f.....     | Iowa City, Ia.....      | Non-Sect....                      | Charles A. Schaeffer, Ph.D....       | 67            | 800        | 23,000                 |
| 1867       | Johns Hopkins Univ.....     | Baltimore, Md.....      | Non-Sect....                      | Daniel Coit Gilman, LL.D....         | 67            | 412        | 37,000                 |
| 1853       | Kentucky Univ. f.....       | Lexington, Ky.....      | Disciples....                     | Chas. W. Gallagher, D.D....          | 18            | 833        | 15,700                 |
| 1824       | Kenyon College.....         | Gambier, O.....         | Prot. Epis....                    | William B. Bodine, D.D....           | 18            | 137        | 20,000                 |
| 1837       | Knox College.....           | Galesburg, Ill.....     | Non-Sect....                      | Hon. N. Bateman, LL.D....            | 27            | 663        | 8,000                  |
| 1832       | Lafayette College.....      | Easton, Pa.....         | Presb.....                        | Trall Green, M.D., LL.D....          | 25            | 320        | 22,500                 |
| 1857       | Lake Forest Univ. f.....    | Lake Forest, Ill....    | Presb.....                        | W. C. Roberts, A.M., D.D., LL.D....  | 105           | 1,451      | 11,000                 |
| 1838       | Lane Theol. Sem.....        | Cincinnati, O.....      | Presb.....                        | Rev. J. A. Craig, Ph.D. (Ch.)....    | 7             | 40         | 10,500                 |
| 1847       | Lawrence University.....    | Appleton, Wis.....      | Meth. Epis....                    | Chas. W. Gallagher, D.D....          | 12            | 201        | 12,000                 |
| 1865       | Lehigh University.....      | S. Bethlehem, Pa....    | Prot. Epis....                    | Robert A. Lamberton, LL.D....        | 25            | 460        | 85,000                 |
| 1866       | Lincoln University.....     | Lincoln, Ill.....       | C'mb. Pres....                    | A. E. Turner, A.M....                | 13            | 200        | 2,000                  |
| 1866       | Maine State College.....    | Orono, Me.....          | Non-Sect....                      | M. C. Fernald.....                   | 17            | 125        | 8,000                  |
| 1863       | Manhattan College.....      | New York City.....      | R. Catholic....                   | Rev. Brother Anthony, F.S.C....      | 31            | 365        | 27,530                 |
| 1835       | Marietta College.....       | Marietta, O.....        | Non-Sect....                      | John Eaton, Ph.D., LL.D....          | 11            | 171        | 42,000                 |
| 1834       | McKendree College.....      | Lebanon, Ill.....       | Meth. Epis....                    | T. H. Herdman, D.D....               | 9             | 134        | 7,000                  |
| 1858       | Mercer University.....      | Macon, Ga.....          | Baptist.....                      | G. A. Nunnally, D.D....              | 16            | 267        | 10,000                 |

(Continued.)

| Organized. | Name.                      | Location.              | Denomi-<br>national Con-<br>trol. | President or Chairman of<br>Faculty. | Instructors * | Students * | Volumes in<br>Library. |
|------------|----------------------------|------------------------|-----------------------------------|--------------------------------------|---------------|------------|------------------------|
| 1809       | Miami University†          | Oxford, O.             | Non-Sect.                         | E. D. Warfield, M.A., LL.B.          | 10            | 70         | 11,000                 |
| 1800       | Middlebury College†        | Middlebury, Vt.        | Non-Sect.                         | Rev. Ezra Brainerd, LL.D.            | 9             | 55         | 16,200                 |
| 1837       | Monmouth College†          | Monmouth, Ill.         | Unit. Presb.                      | J. B. McMichael, A.M., D.D.          | 15            | 321        | 16,000                 |
| 1837       | Mount Holyoke College†     | South Hadley, Mass.    | Non-Sect.                         | Mrs. Elizabeth Storrs Mead           | 35            | 280        | 13,500                 |
| 1808       | Mt. St. Mary's College     | Emmettsburg, Md.       | R. Catholic.                      | Very Rev. Edw. P. Allen, D.D.        | 30            | 180        | 11,000                 |
| 1867       | Muhlenberg College         | Allentown, Pa.         | Lutheran                          | Rev. Theodore L. Seip, D.D.          | 11            | 143        | 8,500                  |
| 1825       | Newton Theol. Inst.        | Newton Center, Mass.   | Baptist                           | Alvah Hovey, D.D., LL.D.             | 9             | 70         | 18,000                 |
| 1855       | Northwestern Univ.†        | Evanston, Ill.         | Meth. Epis.                       | Henry Wade Rogers, LL.D.             | 100           | 1,684      | 29,000                 |
| 1819       | Norwich University         | Norwich, Vt.           | Non-Sect.                         | Charles H. Lewis, LL.D.              | 9             | 58         | .....                  |
| 1842       | Notre Dame College         | Notre Dame, Ind.       | R. Catholic.                      | Rev. Thomas E. Walsh, A.M.           | 48            | 648        | 8,000                  |
| 1833       | Oberlin College            | Oberlin, O.            | Non-Sect.                         | Vacant                               | 69            | 1,800      | 36,000                 |
| 1873       | Ohio State University†     | Columbus, O.           | Non-Sect.                         | William Henry Scott, LL.D.           | 37            | 477        | 9,500                  |
| 1842       | Ohio Wesleyan College†     | Delaware, O.           | Meth. Epis.                       | Jas. W. Bashford, Ph.D., D.D.        | 33            | 1,117      | 14,386                 |
| 1850       | Olivet College†            | Olivet, Mich.          | Cong. & Pr.                       | Horatio Q. Butterfield, D.D.         | 17            | 378        | 18,000                 |
| 1859       | Pennsylvania College†      | Gettysburg, Pa.        | Lutheran                          | H. W. McKnight, D.D., LL.D.          | 16            | 226        | 23,345                 |
| 1890       | Polytechnic Institute (e)  | Brooklyn, N. Y.        | Non-Sect.                         | D. H. Cochran, Ph.D., LL.D.          | 43            | 780        | 3,000                  |
| 1746       | Princeton College          | Princeton, N. J.       | R. Catholic.                      | Rev. Thomas D.D., LL.D.              | 12            | 850        | 71,000                 |
| 1890       | Randolph-Macon College     | Ashland, Va.           | Meth. E. So.                      | Wm. Waugh Smith, LL.D.               | 23            | 277        | 6,500                  |
| 1853       | Ryan College               | Salem, Va.             | Non-Sect.                         | Julius D. Dreher, A.M., Ph.D.        | 10            | 130        | 17,000                 |
| 1885       | Rollins College            | Winter Park, Fla.      | Non-Sect.                         | Edward T. Hooker, A.M., D.D.         | 14            | 134        | .....                  |
| 1766       | Rutgers College            | New Brunswick, N. J.   | Non-Sect.                         | Theodor S. Doolittle, D.D.           | 21            | 201        | 25,762                 |
| 1833       | Rutherford College†        | Rutherford Col., N. C. | Non-Sect.                         | R. L. Abernethy, A.M., D.D.          | 7             | 213        | 1,000                  |
| 1836       | Seton Hall College         | South Orange, N. J.    | R. Catholic.                      | Rev. W. E. Marshall, A.M.            | 14            | 125        | 5,000                  |
| 1865       | Shaw University            | Raleigh, N. C.         | Baptist                           | Rev. H. M. Tupper, D.D.              | 28            | 400        | 7,000                  |
| 1827       | Shurtleff College†         | Upper Orange, Ill.     | Baptist                           | A. A. Kendrick, D.D.                 | 17            | 238        | 8,250                  |
| 187        | Smith College†             | Northampton, Mass.     | Non-Sect.                         | L. Clark Seelye, D.D.                | 31            | 551        | 8,000                  |
| 1873       | Southwestern Baptist Coll. | Jackson, Tenn.         | Baptist.                          | G. W. Jarman, A.M., LL.D.            | 6             | 162        | 5,000                  |
| 1870       | Stevens' Institute Tech.   | Hoboken, N. J.         | Non-Sect.                         | Henry Morton, Ph.D.                  | 17            | 216        | 7,000                  |
| 1847       | St. Francis Xavier College | New York City          | R. Catholic.                      | Rev. David A. Merrick, S.J.          | 20            | 485        | 22,000                 |
| 1789       | St. John's College         | Annapolis, Md.         | Non-Sect.                         | Thomas Fell, LL.D., Ph.D.            | 13            | 151        | 8,000                  |
| 1856       | St. Lawrence University†   | Canton, N. Y.          | Universalist                      | Alpheus Baker Harvey, Ph.D.          | 10            | 97         | 10,000                 |
| 1829       | St. Louis University       | St. Louis, Mo.         | R. Catholic.                      | Rev. J. E. Kennedy, S.J.             | 31            | 427        | 42,000                 |
| 1860       | St. Stephen's College      | Annapolis, Md.         | Prot. Epis.                       | R. B. Fairbairn, D.D., LL.D.         | 7             | 81         | 8,000                  |
| 1869       | Swarthmore College†        | Swarthmore, Pa.        | Friends                           | William D. Foulke                    | 24            | 198        | 18,250                 |
| 1849       | Syracuse University†       | Syracuse, N. Y.        | Meth. Epis.                       | C. N. Sims, D.D., LL.D. (Ch.)        | 51            | 774        | 41,974                 |
| 1823       | Trinity College            | Hartford Conn.         | Prot. Epis.                       | G. W. Smith, D.D., LL.D.             | 15            | 133        | 32,000                 |
| 1859       | Trinity College            | Trinity College, N. C. | Non-Sect.                         | Cyrus Crowell, Dr. Litt.             | 10            | 153        | 7,000                  |
| 1852       | Tufts College              | College Hill, Mass.    | Universalist                      | Elmer H. Capen, D.D.                 | 21            | 150        | 30,000                 |
| 1834       | Tulane University          | New Orleans, La.       | Non-Sect.                         | W. Preston Johnston, LL.D.           | 75            | 1,239      | 62,000                 |
| 1795       | Union College              | Schenectady, N. Y.     | Non-Sect.                         | Harrison E. Webster, LL.D.           | 17            | 130        | 33,200                 |
| 1836       | Union Theological Sem.     | New York City          | Presbyterian.                     | Thos. S. Hastings, D.D., LL.D.       | 9             | 162        | 65,000                 |
| 1802       | U. S. Military Academy     | West Point, N. Y.      | Non-Sect.                         | Col. John M. Wilson, LL.D.           | 53            | 346        | 34,000                 |
| 1845       | U. S. Naval Academy        | Annapolis, Md.         | Non-Sect.                         | Capt. R. L. Phythian, U.S.N.         | 64            | 234        | 81,023                 |
| 1831       | University of Alabama      | Tuscaloosa, Ala.       | Non-Sect.                         | Richard C. Jones, A.M.               | 20            | 216        | 10,000                 |
| 1868       | University of California†  | Berkeley, Cal.         | Non-Sect.                         | Vacant                               | 110           | 750        | 42,000                 |
| 1831       | University City of N. Y.   | New York City          | Non-Sect.                         | H. M. McCracken, D.D., LL.D.         | 98            | 1,270      | 15,000                 |
| 1880       | University of Denver†      | Denver, Col.           | Meth. Epis.                       | W. F. McDowell, S.T.B. (Ch.)         | 100           | 600        | 2,500                  |
| 1785       | University of Georgia      | Athens, Ga.            | Non-Sect.                         | W. E. Boggs, D.D., LL.D. (Ch.)       | 30            | 260        | 17,000                 |
| 1866       | University of Kansas†      | Lawrence, Kan.         | Non-Sect.                         | Francis H. Snow, LL.D.               | 37            | 508        | 13,791                 |
| 1837       | University of Michigan†    | Ann Arbor, Mich.       | Non-Sect.                         | James B. Angell, LL.D.               | 96            | 2,475      | .....                  |
| 1868       | University of Minnesota†   | Minneapolis, Minn.     | Non-Sect.                         | J. M. McKim, LL.D.                   | 105           | 1,100      | 5,000                  |
| 1844       | University of Mississippi† | Oxford, Miss.          | Non-Sect.                         | Edward Mayes, LL.D. (Ch.)            | 16            | 223        | 13,000                 |
| 1840       | University of Missouri†    | Columbia, Mo.          | Non-Sect.                         | M. M. Fisher, D.D., LL.D.            | 28            | 763        | 25,000                 |
| 1869       | University of Nebraska†    | Lincoln, Neb.          | Non-Sect.                         | C. E. Bessey, Ph.D. (Ch.)            | 29            | 513        | 12,000                 |
| 1789       | University of N. Carolina  | Chapel Hill, N. C.     | Non-Sect.                         | Kemp P. Battle, LL.D.                | 16            | 200        | 30,000                 |
| 1753       | University of Penn.        | Philadelphia, Pa.      | Non-Sect.                         | Wm. Pepper, M. D., LL.D.             | 174           | 1,589      | 80,000                 |
| 1850       | University of Rochester    | Rochester, N. Y.       | Baptist                           | David J. Hill, LL.D.                 | 15            | 190        | 25,000                 |
| 1801       | University of S. Carolina  | Columbia, S. C.        | Non-Sect.                         | J. M. McBryde, Ph.D., LL.D.          | 25            | 195        | 30,000                 |
| 1868       | University of the South.   | Sewanee, Tenn.         | Prot. Epis.                       | T. F. Gallor, S.T.B., S.T.D.         | 20            | 249        | 25,000                 |
| 1794       | University of Tennessee    | Knoxville, Tenn.       | Non-Sect.                         | C. W. Dabney, Jr., Ph.D., LL.D.      | 38            | 510        | 13,000                 |
| 1883       | University of Texas†       | Austin, Texas.         | Non-Sect.                         | L. Waggener, A.M., LL.D. (Ch.)       | 17            | 307        | 7,300                  |
| 1791       | University of Vermont†     | Burlington, Vt.        | Non-Sect.                         | Mat. H. Buckham, D.D.                | 34            | 473        | 40,000                 |
| 1819       | University of Virginia     | Charlottesville, Va.   | Non-Sect.                         | Wm. M. Thornton, LL.D. (Ch.)         | 31            | 451        | 51,000                 |
| 1867       | University of Virginia†    | Charlottesville, Va.   | Non-Sect.                         | E. C. Taylor, Ph.D., Dr. Litt.       | 19            | 220        | 11,000                 |
| 1845       | University of Wisconsin†   | Madison, Wis.          | Non-Sect.                         | T. Chamberlain, Ph.D., LL.D.         | 70            | 800        | 33,000                 |
| 1868       | University of Wooster†     | Wooster, O.            | Presbyterian.                     | Rev. Sylvester F. Scovel             | 40            | 750        | 12,000                 |
| 1873       | Vanderbilt University      | Nashville, Tenn.       | Methodist.                        | L. C. Garland, A.M., LL.D.           | 60            | 637        | 18,000                 |
| 1861       | Vassar College             | Poughkeepsie, N. Y.    | Non-Sect.                         | James M. Taylor, D.D.                | 34            | 324        | 18,000                 |
| 1832       | Wabash College             | Crawfordsville, Ind.   | Presbyterian.                     | Jos. F. Tuttle, D.D., LL.D.          | 14            | 258        | 32,000                 |
| 1833       | Wake Forest College        | Wake Forest, N. C.     | Baptist                           | C. E. Taylor, Ph.D., Dr. Litt.       | 11            | 220        | 11,000                 |
| 1822       | Washington College         | Washington, D. C.      | Unit. Presb.                      | Rev. E. G. Ragsdale, D.D.            | 19            | 274        | 1,000                  |
| 1782       | Washington & Lee Univ.     | Lexington, Va.         | Non-Sect.                         | Gen. G. W. C. Lee, LL.D.             | 17            | 219        | 23,500                 |
| 1854       | Washington University†     | St. Louis, Mo.         | Non-Sect.                         | Marshall S. Snow (Act. Ch.)          | 41            | 526        | 10,000                 |
| 1875       | Wellesley College†         | Wellesley, Mass.       | Non-Sect.                         | Helen A. Shafer, M.A.                | 81            | 694        | 36,450                 |
| 1868       | Wells College†             | Aurora, N. Y.          | Presbyterian.                     | Edward S. Frisbee, D.D.              | 14            | 80         | 3,000                  |
| 1831       | Wesleyan University†       | Middletown, Conn.      | Meth. Epis.                       | B. P. Raymond, D.D., LL.D.           | 26            | 251        | 39,000                 |
| 1826       | Western Reserve Univ.†     | Cleveland, O.          | Non-Sect.                         | H. C. Hayden, D.D., LL.D.            | 76            | 746        | 28,000                 |
| 1852       | Westminster College        | New Wilmington, Pa.    | Unit. Presb.                      | Rev. E. G. Ragsdale, D.D.            | 11            | 274        | 1,000                  |
| 1693       | William & Mary College     | Williamsburg, Va.      | Non-Sect.                         | Lyon G. Tyler, M.A.                  | 8             | 188        | 7,000                  |
| 1793       | Williams College           | Williamstown, Mass.    | Non-Sect.                         | Franklin Carter, Ph.D., LL.D.        | 24            | 311        | 30,000                 |
| 1854       | Wofford College            | Spartanburg, S. C.     | Methodist                         | Jas. H. Carlisle LL.D.               | 10            | 225        | 6,000                  |
| 1701       | Yale University            | New Haven, Conn.       | Cong.                             | Timothy Dwight, D.D., LL.D.          | 150           | 1,625      | 200,000                |

\* All departments.

† Co-education of the sexes.

‡ Education of women only.

(a) Annex of Columbia College. (b) A majority of the trustees were Baptists. (c) Rector. (d) Name changed from "Madison University" to "Coigate University" 1890. (e) Brooklyn College and Polytechnic Institute founded 1854; reorganized. 1890. with full college powers, as the Polytechnic Institute of Brooklyn.



**LIST OF COLLEGES IN THE DOMINION OF CANADA,** as reported by the *Canadian Almanac and Directory* for the year 1891. No statistical summaries were given. The name of the college, its location, and the presiding officer of the faculty are here printed under caption "president." In some cases he is designated as chancellor, dean, or principal.

University of Toronto—Sir Daniel Wilson, LL.D., F.R.S.E.  
Queen's University, Kingston—Sanford Fleming, C.E., C.M.G., LL.D.  
McGill University, Montreal—Hon. Sir D. A. Smith, K.C.M.G., LL.D.  
Trinity University, Toronto—Hon. G. W. Allen, D.C.L.  
Victoria University, Cobourg—Rev. N. Burwash, S.T.D.  
McMaster University, Toronto—  
University of Mount Allison College, Sackville, N. B.—J. R. Lynch, LL.D.  
University of King's College, Windsor, N. S.—Rev. E. C. Willets, M.A., D.C.L.  
University of Acadia College, Wolfville, N. S.—Rev. A. W. Sawyer, D.D.  
University of Ottawa—Rev. J. McGuckin, O.M.I., M.A.  
Wycliffe College, Toronto—Rev. James Paterson Sheraton, D.D.  
Knox College, Toronto—W. M. Clark, M.A.  
Wesleyan Theological College, Montreal—Rev. Principal Douglas, D.D., LL.D.  
Montreal Diocesan Theological College—Rev. W. B. Bond, D.D., LL.D.  
Presbyterian College, Montreal—D. H. MacVicar, D.D., LL.D.  
Royal Military College, Kingston—Major-General D. R. Cameron, C.M.G.  
Ontario Agricultural College, Guelph—James Mills, M.A.  
Upper Canada College, Toronto—George Dickson, M.A.  
St. Michael's College—Rev. V. Marjion, C.S.B.

Assumption College, Sandwich—Rev. D. Cushing.  
Bishop Ridley College, St. Catharines—Rev. J. O. Miller, M.A.  
Trinity College, Port Hope—Rev. C. J. S. Bethune, M.A., D.C.L.  
St. Jerome's College, Berlin—Rev. Theo. Spetz, C.R., D.D.  
Brantford Young Ladies' College—W. Cochran, M.A., D.D.  
Coligny College, Ottawa—Principal MacVicar, D.D., LL.D.  
Demill Ladies' College, Oshawa—Rev. A. D. Demill.  
Hellmuth College, London—I. F. Hellmuth, LL.D.  
Mt. Allison Wesleyan Ladies' College, Sackville—Rev. B. C. Borden, M.A.  
Ontario Ladies' College, Whitby—G. Y. Smith, LL.B.  
Presbyterian Ladies' College, Toronto—T. M. McIntyre, M.A., LL.B., Ph.D.  
St. Hilda's College, Toronto—Lord Bishop of Toronto.  
Wesleyan Ladies College, Hamilton—A. Burns, D.D., LL.D.  
Royal College of Physicians and Surgeons, Kingston—Fife Fowler, M.D., L.R.C.S.  
University of Toronto (medical faculty), Hon. Edward Blake, M.A.  
McGill University, Montreal (medical faculty), Sir Wm. Dawson, C.M.G., LL.D., F.R.S.  
Trinity Medical College, Toronto—Walter B. Geikie, M.D. C.M., F.R.C.S.E., L.R.C.P.  
Women's Medical College, Toronto—R. B. Nevitt, B.A., M.D.  
Women's Medical College, Kingston—Hon. M. Sullivan, M.D., F.R.C.P.S.K.

**COLLEGES AND UNIVERSITIES OF LIBERAL ARTS IN THE UNITED STATES.** The subjoined table gives the statistical summaries of these institutions by States and Territories. They were prepared and kindly furnished by the United States Bureau of Education, and are the latest summaries on the items given which had been reported to the public up to Jan. 1, 1891. They are for the school year closing in 1889:

| STATES AND TERRITORIES.   | Institutions. | Professors and Teachers. | In Preparatory Department. | In Collegiate Department. | Students. | Volumes Libraries. | Value of Scientific Apparatus. | Value of Grounds and Buildings. | Permanent Productive Funds. |
|---------------------------|---------------|--------------------------|----------------------------|---------------------------|-----------|--------------------|--------------------------------|---------------------------------|-----------------------------|
| Alabama.....              | 5             | 64                       | 60                         | 497                       | 1,049     | 22,400             | \$22,850                       | \$750,000                       | \$826,000                   |
| Arkansas.....             | 4             | 22                       | 196                        | 84                        | 449       | 2,600              | 90                             | 123,000                         | 6,000                       |
| California.....           | 13            | 201                      | 1,563                      | 1,174                     | 3,295     | 87,312             | 223,550                        | 1,917,000                       | 2,061,500                   |
| Colorado.....             | 4             | 53                       | 365                        | 140                       | 747       | 20,000             | 26,200                         | 1,014,023                       | 217,000                     |
| Connecticut.....          | 8             | 90                       | .....                      | 1,037                     | 1,169     | 208,000            | 61,480                         | 1,400,000                       | 1,216,556                   |
| Dakota.....               | 1             | 63                       | 528                        | 97                        | 1,136     | 10,027             | 22,345                         | 430,000                         | 25,000                      |
| District of Columbia..... | 5             | 74                       | 341                        | 225                       | 736       | 77,311             | 5,500                          | 1,000,000                       | 430,000                     |
| Florida.....              | 4             | 28                       | 267                        | 45                        | 357       | 5,600              | 1,650                          | 109,056                         | 20,000                      |
| Georgia.....              | 6             | 70                       | 297                        | 485                       | 1,175     | 46,500             | 89,505                         | 803,000                         | 749,870                     |
| Illinois.....             | 26            | 359                      | 2,192                      | 1,710                     | 5,757     | 158,311            | 73,550                         | 2,582,200                       | 3,046,183                   |
| Indiana.....              | 14            | 224                      | 1,028                      | 1,159                     | 3,659     | 116,100            | 103,000                        | 1,955,000                       | 2,087,000                   |
| Iowa.....                 | 21            | 288                      | 2,516                      | 1,638                     | 5,297     | 96,752             | 73,164                         | 1,247,896                       | 1,107,142                   |
| Kansas.....               | 15            | 208                      | 1,652                      | 623                       | 4,413     | 53,383             | 140,650                        | 1,700,050                       | 434,100                     |
| Kentucky.....             | 14            | 127                      | 697                        | 1,038                     | 2,071     | 51,364             | 16,750                         | 811,250                         | 1,090,407                   |
| Louisiana.....            | 12            | 165                      | 1,291                      | 484                       | 3,002     | 115,032            | 98,150                         | 972,197                         | 1,558,030                   |
| Maine.....                | 3             | 35                       | .....                      | 441                       | 443       | 79,126             | 70,000                         | 660,000                         | 1,215,767                   |
| Maryland.....             | 8             | 159                      | 458                        | 716                       | 1,457     | 70,630             | 186,104                        | 1,133,320                       | 3,006,000                   |
| Massachusetts.....        | 16            | 223                      | 2,580                      | 2,877                     | 355,306   | 915,000            | 5,068,000                      | 5,937,586                       | 9,397,586                   |
| Michigan.....             | 10            | 173                      | 887                        | 1,607                     | 3,246     | 110,259            | 511,200                        | 1,534,975                       | 1,385,652                   |
| Minnesota.....            | 8             | 109                      | 572                        | 685                       | 1,740     | 50,600             | 102,445                        | 1,288,554                       | 2,288,554                   |
| Mississippi.....          | 4             | 35                       | 538                        | 350                       | 902       | 16,750             | 50,700                         | 423,000                         | 549,611                     |
| Missouri.....             | 20            | 294                      | 1,388                      | 1,000                     | 3,500     | 127,800            | 172,600                        | 2,883,000                       | 1,792,464                   |
| Montana.....              | 1             | 14                       | 80                         | 82                        | 150       | 1,000              | 1,600                          | 100,000                         | 10,000                      |
| Nebraska.....             | 7             | 82                       | 491                        | 373                       | 1,125     | 27,500             | 86,330                         | 1,150,000                       | 1,068,000                   |
| Nevada.....               | 1             | 7                        | .....                      | 43                        | 143       | 1,100              | 2,000                          | 85,000                          | 125,000                     |
| New Hampshire.....        | 1             | 30                       | .....                      | 229                       | 239       | 68,000             | 100,000                        | 200,000                         | 850,000                     |
| New Jersey.....           | 4             | 80                       | 41                         | 804                       | 961       | 163,800            | 50,500                         | 495,000                         | .....                       |
| New Mexico.....           | 2             | 8                        | 95                         | 195                       | 25        | 25                 | .....                          | 36,000                          | 1,000                       |
| New York.....             | 19            | 386                      | 2,386                      | 3,233                     | 6,080     | 855,824            | 888,719                        | 5,535,209                       | 9,278,030                   |
| North Carolina.....       | 10            | 91                       | 401                        | 929                       | 1,571     | 68,913             | 51,300                         | 827,000                         | 320,000                     |
| Ohio.....                 | 35            | 606                      | 3,377                      | 3,061                     | 8,736     | 265,871            | 251,831                        | 3,865,741                       | 4,148,850                   |
| Oregon.....               | 4             | 85                       | 167                        | 220                       | 587       | 19,963             | 21,100                         | 110,000                         | 284,000                     |
| Pennsylvania.....         | 26            | 426                      | 3,175                      | 2,249                     | 5,793     | 313,480            | 446,800                        | 5,249,000                       | 4,886,994                   |
| Rhode Island.....         | 1             | 22                       | .....                      | 268                       | 268       | 70,000             | .....                          | 625,000                         | 980,836                     |
| South Carolina.....       | 8             | 77                       | 283                        | 525                       | 1,061     | 43,700             | 125,500                        | 536,500                         | 637,400                     |
| Tennessee.....            | 8             | 219                      | 1,468                      | 1,445                     | 4,370     | 91,184             | 188,950                        | 1,819,650                       | 1,708,310                   |
| Texas.....                | 10            | 110                      | 844                        | 1,200                     | 2,416     | 22,353             | 55,340                         | 568,000                         | 594,800                     |
| Utah.....                 | 1             | 16                       | .....                      | .....                     | 312       | 4,000              | 3,000                          | 150,000                         | .....                       |
| Vermont.....              | 2             | 24                       | .....                      | 186                       | 335       | 52,673             | 154,000                        | 870,000                         | 438,000                     |
| Virginia.....             | 7             | 91                       | 54                         | 764                       | 1,277     | 128,000            | 308,800                        | 1,601,500                       | 1,450,454                   |
| Washington.....           | 3             | 19                       | 121                        | 165                       | 415       | 6,150              | 8,800                          | 90,000                          | 13,000                      |
| West Virginia.....        | 3             | 81                       | 132                        | 235                       | 889       | 7,200              | 10,000                         | 167,150                         | 167,150                     |
| Wisconsin.....            | 9             | 186                      | 831                        | 955                       | 2,001     | 84,123             | 162,600                        | 1,468,000                       | 484,756                     |
| Wyoming.....              | 1             | 12                       | 44                         | 9                         | 89        | 1,500              | 8,000                          | 150,000                         | .....                       |
| Total.....                | 384           | 5,422                    | 24,856                     | 34,286                    | 89,090    | 3,694,825          | \$5,911,813                    | \$56,115,126                    | \$60,597,442                |

Of the total number of professors and teachers 750 were in the preparatory department, and 2,575 in the collegiate; of the students, 29,856 were in the preparatory department, and 34,286 in the collegiate; total number of endowed professorships, 354. The summaries for Dakota include those for South and North Dakota, as the date before these two new States were admitted.

COLLEGE POINT, a village of New York, situated on the northern shore of Long Island, about ten miles east of New York city. It contains a variety of manufactories and many fine residences of the business men of the metropolis.

COLLEGIATE CHURCHES, so called in England from having a college or chapter, consisting of a dean or provost and canons attached to them. They date from the 9th century, when such foundations in large towns became frequent. They are under the jurisdiction of the bishop of the diocese in which they are situated, and he exercises visitatorial powers over them.

COLLIER, JOHN PAYNE, a Shakespearean critic and commentator, born in London in 1789, died Sept. 17, 1883. While still a boy he became Parliamentary reporter for the "London Times," and subsequently for the "Morning Chronicle," but his real literary career commenced in 1820 with the publication of *The Poetical Decameron*. The more important of his publications were, a *History of English Dramatic Poetry to the Time of Shakespeare*; *Notes and Emendations to the Plays of Shakespeare*; *Bibliographical and Critical Account of the Rarest Books in the English Language* (1835); and *An Old Man's Diary Forty Years Ago* (1872). In one of his publications he announced the discovery of an extensive series of marginal annotations in a 17th-century hand on a copy of the second Shakespeare folio (1631-32)—the famous Perkins folio. This announcement caused a great commotion in the literary world, but it was subsequently shown that they were forgeries, and the discovery after his death of some manipulated books in his own library greatly injured his reputation.

COLLIMATOR, a subsidiary telescope used to detect or correct errors in collimation; that is, in directing the sight to a fixed object when adjusting for transit observations. When the vertical thread in the field of view exactly coincides with the vertical axis of a telescope, the instrument is *collimated* vertically; and when the horizontal spider's thread just covers the horizontal axis, the instrument is correct in horizontal collimation.

COLLIN, a town of Bohemia, situated on the Elbe. It has manufactories of cotton and potash. Garnets, topazes and cornelians are found in the vicinity. Population, 9,460.

COLLINGWOOD, a town of Ontario, Canada, situated on the south shore of Georgian Bay. It produces a large variety of manufactures, and is an important center of trade and transportation.

COLLINS, WILLIAM WILKIE, a celebrated English novelist, born in London, Jan. 8, 1824, died there Sept. 23, 1889. He was educated partly at Highbury, but from 1836 to 1839 was with his parents in Italy. After his return to London he spent four years in business, but finding it uncongenial he entered Lincoln's Inn as a student-at-law. Here his literary bent manifested itself, the life of his father (1848) being his earliest production. He now entered upon an active career, devoting himself principally to works of fiction, several of them being first published as serial stories in "Household Words," "All the Year Round," the "Cornhill," and other periodicals to which he contributed. His best known works are: *Antonina*, or *The Fall of Rome* (1850); *Basil* (1852); *Hide and Seek* (1854); *The Dead Secret* (1857); *The*

*Woman in White* (1860); *No Name* (1862); *Armada* (1866); *The Moonstone* (1868); *The New Magdalen* (1873); *The Law and the Lady* (1875); *Alice Warlock* (1875); *The Evil Genius*, and *The Guilty River* (1886). Doubtless the best of these productions was the *Woman in White*, and the reputation this masterpiece of fiction made for him in England spread rapidly to America and the Continent, until his readers could be found in every civilized country on the globe. The powerful interest of his novels always lay in the mystery that was continued to the end of them, and in the art by which the reader's attention was held fixed and curious through the succeeding chapters. He visited the United States in 1873-74, and the distinguished consideration with which he was everywhere received afforded him great pleasure.

COLLINSON, PETER, botanist, born at Hugal Hall, near Windermere, Jan. 14, 1694, died Aug. 11, 1768. Although he became an extensive manufacturer of hosiery, in connection with which he did a large business with the American colonies, he was chiefly distinguished as a botanist. He introduced numerous European plants into the United States, and many American trees into England. A genus of labiate plants is named *Collinsonia*, after him.

COLLINSONIA, a genus of handsome plants found chiefly on the Pacific coast of the United States. They belong to the natural order *Scrophulariaceae*. Several species are cultivated for the beauty of their flowers.

COLLINSVILLE, a manufacturing town of Hartford county, Conn., on the Farmington River. Paper, plows, axes and cutlery are here manufactured.

COLLINSVILLE, a city of Illinois, pleasantly situated in the midst of a fertile agricultural district, about 12 miles east of St. Louis.

COLLOID, a name applied by Graham to any soluble substance which, when exposed to *dialysis*, does not pass through the porous membrane. Starch, gum albumen, and gelatine are examples of colloids. The name is used in contradistinction to *crystalloid*.

COLLISION, the act of striking or dashing together. In maritime law, although the term collision is applied to all cases of vessels running foul, technically it only applies to the act of two vessels striking together; when one vessel strikes against another, it is called *allision*. In either case the injured parties have, under the general maritime laws of all civilized nations, a claim against the offending vessel for any damage resulting. There may be a collision without actual contact, as where one vessel by careless navigation compels another to run ashore to escape greater peril. Collisions are usually classified as follows: (1) Those which occur without blame attaching to either vessel; as where the injury is occasioned by a storm. In such cases the misfortune must be borne by the party on whom it happens to light, the other not being responsible to him in any degree. (2) Those which arise where both vessels are at fault—where there has been a want of due diligence or of skill on both sides. In such cases the law apportions the resulting damage between them, both having contributed to the injury. (3) Those in which the injured vessel is alone at fault; in which case the owners must bear their own loss. (4) Those in which the injured vessel is free from blame, and the collision is the result of negligence or violation of the rules of navigation by the other. In this class of cases the offending vessel must respond in damages for all losses sustained.

There are certain rules of navigation which have been adopted by the courts of all nations, and have



the effect of positive law. They may be generally stated as follows: (1) When two sailing or steam vessels are approaching each other bow on, or nearly so, both helms must be put to port, so that each may pass on the port side of the other. (2) When two sailing vessels are crossing, and have the wind on different sides, the one with the wind on the starboard side shall have the right of way—unless she is sailing with the wind free, and the other is closehauled; in which case the vessel with the wind free must give way to the other. If both have the wind on the same side, or one has it aft, the windward vessel must keep out of the way of the other. (3) As a steamboat is deemed as always sailing with a free and fair wind, and capable of better control than a sailing vessel, the former must always keep out of the way of the latter. (4) Every vessel overhauling another must keep out of the way of the latter. (5) A vessel clearing out of a harbor must make way for another vessel that enters. (6) When two steam vessels approach each other on such a course that a collision is possible, each shall slacken speed, and if necessary stop and reverse; and in a fog steam vessels must go at a moderate speed. (7) The master of a vessel entering a port or river where other vessels are lying at anchor, is bound to make use of all proper checks to stop the headway of his vessel, in order to prevent accidents.

Although the foregoing are *rules*, adopted for the general guidance of masters of vessels, they are subordinate to the rule prescribed by common sense, which is that every vessel shall keep clear of every other vessel when she has the power to do so, notwithstanding such other vessel may have taken a course in violation of the rules of navigation. In no case would a master be justified in keeping his course after it became apparent that to do so would result in a collision, if by changing such course without injury a collision could be avoided.

All vessels are required to display lights at night, whether sailing vessels or steamboats, and whether under way or at anchor. These lights and their arrangement are such that the observer can tell whether they are carried by a sailing or steam vessel, whether the vessel is under way or at anchor, and if under way, the course the vessel is steering. The rules regarding lights are as follows: (1) Sea-going steamers, while under way, must display at the foremast head a bright white light, on the starboard side a green light, and on the port side a red one. The side lights must be so arranged with inboard screens that they cannot be seen across the vessel's bow. (2) Steamers having other vessels in tow must display two white lights at the masthead, instead of one. (3) Sailing vessels must display the green and red side lights described above, but none at the masthead. (4) All vessels at anchor, whether propelled by wind or steam, must display, not more than twenty feet above the hull, a white light in a globular lantern, eight inches in diameter.

In fogs, whether by day or night, steam vessels under way must sound a steam-whistle at intervals of not more than one minute; sailing vessels under way must sound a fog-horn at intervals of not more than five minutes; and when at anchor, both steamers and sailing vessels must ring a fog-bell at intervals of not more than five minutes.

**COLLUSION**, a deceitful agreement between two or more persons to defraud or prejudice a third person, or for some improper purpose. The most common cases of collusion occur in arrangements between bankrupts and their creditors, such as payment by anticipation to a favored creditor on

the approach of bankruptcy, arrangements for granting preferences by circuitous transactions or otherwise. In judicial proceedings collusion is an agreement between two persons that one should institute a suit against the other in order to obtain a judicial decision for some improper purpose. Judgments so obtained are void.

**COLLYER**, ROBERT, an Anglo-American clergyman, born in Keighly, Yorkshire, England, in 1823. In 1843 he became a local Methodist preacher, and the following year came to the United States. In 1859 he united with the Unitarian church, and became a missionary in Chicago, Ill. In 1860 he organized the Unity church, and in 1861 was a camp-inspector for the sanitary commission. In 1879 he became pastor of the Church of the Messiah in New York city.

**COLOCYNTH**. See *Britannica*, Vol. VI, p. 150.

**COLOCZA**, or **KALOCSA**, a town of Hungary, situated on the Danube, 68 miles south of Pesth. Population, 16,302.

**COLOGNE YELLOW**, a pigment composed of two parts of yellow chromate of lead, one of sulphate of lead, and seven of sulphate of lime or gypsum.

**COLOMBANO**, SAN, a town of Northern Italy, in the province of Milan, on the right bank of the Lambro, situated in the midst of hills, in which are found porphyry, feldspar, granite and limestone. Population, 5,000.

**COLOMBIA** (La Republica de Colombia). See *Britannica*, Vol. VI, pp. 152-57. A republic of Central America, formed by the union in 1861 of nine States, namely: Antioquia, Bolivar, Boyaca, Cauca, Cundinamarca, Magdalena, Panama, Santander and Tolima—under the title of the "United States of New Granada," changed in 1871 to that of the "United States of Colombia." A revolution in 1885 brought about another change, and the National Council of Bogota, composed of three delegates from each State, promulgated a new constitution Aug. 4, 1886, and the country is now styled the "Republic of Colombia." By the new constitution the sovereignty of the nine States was abolished, and they became simple departments, their presidents, elected by ballot, being reduced to governors under the direct nomination of the President of the Republic, whose term of office was prolonged from two to six years. The legislative power rests with a congress of two houses, called the Senate and the House of Representatives. The Senate, as before, consists of 27 members, three from each department, and the House of Representatives of 66 members, elected by universal suffrage, each department forming a constituency, and returning one member for 50,000 inhabitants.

The area of the Republic is 513,938 sq. miles, of which 330,756 sq. miles are north of the equator and the remainder south of the equator. Population, about 4,500,000. The capital is Bogota, with a population of 100,000. The revenue of the Republic for 1889 was, in round numbers, \$21,500,000, and expenditures \$28,000,000. Its industries are chiefly confined to agriculture and the rearing of cattle. Gold is found in all the departments, and Tolima is rich in silver. The imports of Colombia for 1889 amounted to 11,777,624 pesos, and the exports to 16,199,718 pesos. The bulk of the foreign trade is with the United States and Great Britain. The strength of the army in time of peace is 6,500 men. The total length of railways in 1890 was 218 miles, and in 1888 there were 2,800 miles of telegraph in operation.

**COLON**, that portion of the large intestine which extends from the cæcum to the rectum, which is the terminal portion of the intestinal canal.

**COLONEL** (Ital., *colonello*, "leader of a column"), the chief officer of a regiment in the United States army, ranking next below brigadier-general. In Great Britain regimental colonels are general officers who have had a regiment "given to them" as a reward for long service, and virtually as an honorary retirement. In 1888 it was decided to discontinue these appointments as soon as those who have a vested right to succeed to them have been satisfied, and it has been decided that no officer shall obtain the rank of colonel except by brevet, or on being selected for certain appointments carrying with them that rank. In the German, Austrian and Russian armies, where the regiments are very large, the colonelcies are mostly honorary posts, held by royal and other distinguished personages.

**COLONIA DO SANTISSIMO SACRAMENTO**, a port of Uruguay or Banda Oriental, situated on the left bank of the Plata, about 100 miles above Monte Video, the capital of the State.

**COLONIAL ANIMALS**, organisms which cannot be fairly regarded as unities, but consist of numerous more or less similar individuals united in a common life. The process of asexual budding, which leads to the formation of compound organisms, is commonest in relatively passive vegetative animals, like sponges, hydroids, corals, polyzoa, and ascidians, and is an expression of their general physiological constitution. When the colonial organism is free-living, as in *Siphonophora* and some *Tunicata*, the individual members are more closely knit together, and the colony is more perfectly integrated. Some colonial forms are of importance as illustrating in loose union an order of individuality, which in higher types becomes more firmly unified.

**COLONIZATION SOCIETY, THE AMERICAN**, a society organized in 1816 by Bishop Meade, of Virginia, Rev. Dr. Finley, of New Jersey, Charles F. Mercer, of Virginia, and others, for the purpose of transferring negroes from the United States and colonizing them in Africa. The first president of the society was Bushrod Washington. Henry Clay was for many years president of the society. The first colonists, consisting of 86 persons, were sent in 1820 to Africa, to the west coast of Africa, where they founded the Republic of Liberia. The practical work of the society terminated soon after emancipation of the colored people of the United States.

**COLONIES, THE AMERICAN**. See **UNITED STATES**, **BRITANNICA**, Vol. XXIII, pp. 729-87.

**COLONNA, CAPE** (ancient *Sunium Promontorium*), a headland of Greece, forming the southmost point of Attica. Its summit, crowned by the ruins of the temple of Minerva, rises 270 feet above the water. Sixteen white marble columns, from which the cape derives its name, are still standing.

**COLONNADE**, the name given to a series of columns placed at certain intervals from one another, and arranged in various ways according to the rules of art and the order employed.

**COLONSAY**, an island of the Hebrides, in Argyleshire, Scotland, near the isle of Oronsay. Population, 400.

**COLOR**, in music, is applied to those passages and harmonic progressions in bravura airs affording the singer an opportunity of display. It is also applied to all grand harmonic combinations in orchestral compositions.

**COLORADO**. For the early history, geography, climate, productions, and earlier statistics, see **BRITANNICA**, Vol. VI, pp. 161-63. The census of 1890 gives the area of the State of Colorado as 103,925 sq. miles; population, 412,198; capital, Denver, with

a population of 126,186. The following table shows the population of the State by counties for the years 1880 and 1890, as officially reported by the census of those years:

| County.          | 1890.   | 1880.  |
|------------------|---------|--------|
| Arapahoe.....    | 132,185 | 38,644 |
| Archuleta.....   | 826     |        |
| Baca.....        | 1,479   |        |
| Bent.....        | 1,813   | 1,654  |
| Boulder.....     | 14,082  | 9,723  |
| Chaffee.....     | 6,812   | 6,513  |
| Cheyenne.....    | 534     |        |
| Clear Creek..... | 7,184   | 7,823  |
| Conejos.....     | 7,193   | 5,605  |
| Costilla.....    | 3,491   | 2,879  |
| Custer.....      | 2,970   | 8,080  |
| Delta.....       | 2,534   |        |
| Dolores.....     | 1,498   |        |
| Douglas.....     | 3,006   | 2,436  |
| Eagle.....       | 3,725   |        |
| Elbert.....      | 1,856   | 1,708  |
| El Paso.....     | 21,239  | 7,949  |
| Fremont.....     | 9,156   | 4,736  |
| Garfield.....    | 4,478   |        |
| Gilpin.....      | 5,867   | 6,469  |
| Grand.....       | 604     | 417    |
| Gunnison.....    | 4,359   | 8,235  |
| Hinsdale.....    | 862     | 1,487  |
| Huerfano.....    | 6,882   | 4,124  |
| Jefferson.....   | 8,450   | 6,804  |
| Kiowa.....       | 1,243   |        |
| Kit Carson.....  | 2,472   |        |
| Lake.....        | 14,663  | 23,563 |
| La Plata.....    | 5,509   | 1,111  |
| Larimer.....     | 9,712   | 4,892  |
| Las Animas.....  | 17,208  | 8,908  |
| Lincoln.....     | 689     |        |
| Logan.....       | 3,070   |        |
| Mesa.....        | 4,200   |        |
| Montezuma.....   | 1,539   |        |
| Montrose.....    | 3,980   |        |
| Morgan.....      | 1,601   |        |
| Otero.....       | 4,192   |        |
| Ouray.....       | 6,510   | 2,669  |
| Park.....        | 3,548   | 3,970  |
| Phillips.....    | 2,642   |        |
| Pitkin.....      | 8,229   |        |
| Prowers.....     | 1,969   |        |
| Pueblo.....      | 81,491  | 7,617  |
| Rio Blanco.....  | 1,200   |        |
| Rio Grande.....  | 3,451   | 1,934  |
| Routt.....       | 2,369   | 132    |
| Saguache.....    | 8,313   | 1,973  |
| San Juan.....    | 1,572   | 1,187  |
| San Miguel.....  | 2,909   |        |
| Sedgwick.....    | 1,233   |        |
| Summit.....      | 1,906   | 5,459  |
| Washington.....  | 2,301   |        |
| Weld.....        | 11,736  | 5,646  |
| Yuma.....        | 2,596   |        |

The increase of the population in the State from 1880 to 1890 was 217,871, a gain of more than 100 per cent. The number of Indians living on reservations in the State in 1890 was 985, including 484 males and 501 females. During the last decade much attention has been given to irrigation. The wealth of Colorado lies largely in her mines, to the working of which a large proportion of her people are devoted. The public school system was early made a prominent feature in the policy of the State. The Denver University is a large and growing institution. There are also a State University located at Boulder, a school of mines at Golden, an agricultural college at Fort Collins, a mute and blind institute at Colorado Springs, and an industrial school at Golden, all of which are liberally provided for. Numerous private institutions of high order have also been established. Denver is the chief railroad center of the State. From that city the Union Pacific Railway system radiates in four directions. The Denver and Rio Grande, the Burlington route, the Denver and New Orleans, and the Atchison, Topeka and Santa Fé, are all important railway lines in the State. The great parks of the State are nat-



ural gardens. Their approximate areas and elevations are as follows:

|                    |                                               |
|--------------------|-----------------------------------------------|
| North Park.....    | area, 2,500 sq. miles; elevation, 9,000 feet. |
| Middle Park.....   | 3,000 " " 8,500 "                             |
| South Park.....    | 2,300 " " 9,500 "                             |
| Estes Park.....    | 100 " " 7,500 "                               |
| San Luis Park..... | 8,000 " " 7,500 "                             |

Coal of a superior quality is found in many parts of the State, and the supply is regarded as comparatively inexhaustible.

The following is a full list of the governors of Colorado to and including 1891:

TERRITORIAL.

|                      |         |                       |         |
|----------------------|---------|-----------------------|---------|
| John Evans.....      | 1862-65 | Edw. W. McCook.....   | 1869-73 |
| Alex. Cummings.....  | 1865-67 | Samuel H. Elbert..... | 1873-74 |
| A. Cameron Hunt..... | 1867-69 | John L. Routt.....    | 1875-76 |

STATE.

|                     |         |                     |         |
|---------------------|---------|---------------------|---------|
| John L. Routt.....  | 1877-79 | Benj. H. Eaton..... | 1885-87 |
| F. W. Pitkin.....   | 1879-81 | Alva Adams.....     | 1887-89 |
| James B. Grant..... | 1883-85 | Job A. Cooper.....  | 1889-91 |

The wheat acreage of Colorado in 1889 was estimated at 25,930 acres, yielding 337,000 bushels, valued at \$252,818; its oats acreage, 97,791 acres, yielding 3,129,000 bushels, valued at \$1,251,725; its barley acreage, 12,377 acres, yielding 319,000 bushels, valued at \$223,529; potatoes, 28,903 acres, yielding 2,717,000 bushels, valued at \$1,222,597; hay, 246,675 acres, yielding 370,013 tons, valued at \$4218,148; Indian corn, 84,394 acres, yielding 777,000 bushels, valued at \$442,890.

COLORADO, a city of Texas, county-seat of Mitchell county, 70 miles west of Abilene. It contains very extensive manufactories of salt and soda.

COLORADO BEETLE. See *Britannica*, Vol. VI, pp. 134, 163.

COLORADO SPRINGS, a popular summer-resort of Colorado, situated on the Fontaine-qui-Bouille Creek, 75 miles south of Denver by rail, and about 10 miles east of Pike's Peak.

COLOR BLINDNESS. See *Britannica*, Vol. VIII, p. 824, and Vol. XIV, p. 579. See also Vol. VI, p. 784, and Vol. XV, p. 282.

COLOR-SERGEANT, a name given in the army to the sergeant who, in addition to other duties, guards and carries the national colors—that is, the flag.

CLOSTRUM, the term applied to the first milk yielded after delivery. It differs very materially from ordinary milk, and generally appears as a turbid, yellowish fluid.

COLQUHOUN, PATRICK, born at Dumbarton, Scotland, in 1745, died April 25, 1820. He became provost of Glasgow in 1782, and a police magistrate in London in 1792. He was the author of two important works, *Police of the Metropolis* (1795), and *Population, Wealth, Power and Resources of the British Empire* (1814).

COLTON, a town most healthfully situated in a fruit-raising section of San Bernardino county, Cal. It has canning and packing works, and manufactures iron and steel pipes and lime.

COLTON, CALVIN (1789-1857), an American clergyman. He entered the ministry of the Protestant Episcopal church, but relinquished preaching in 1829 from failure of his voice. From 1831 to 1835 he was in England as correspondent of the New York "Observer," and on his return to the United States distinguished himself as a writer of political tracts, advocating the principles of the Whig party. He was editor of the "True Whig," in Washington, from 1842 to 1844. In 1852 he became professor of political economy in Trinity Col-

lege, Hartford, Conn. He wrote numerous works on religious, political and other subjects.

COLUBER, a genus of snakes. See *Britannica*, Vol. XXII, p. 194.

COLUMBIA, or OREGON RIVER, the largest American river that enters the Pacific. It rises in the Rocky Mountains in British Columbia, flows northwest, then, southwest, and then westerly, forming the boundary between Washington and Oregon. It is navigable for the largest steamers for 140 miles. Its entire length is 1,400 miles.

COLUMBIA, the county-seat of Boon county, Mo., situated 10 miles north of the Missouri River. It is the seat of the State University, and has two female colleges.

COLUMBIA, a city of Pennsylvania, located in Lancaster county, on the east bank of the Susquehanna River, and on the Columbia branch of the Pennsylvania railroad, 81 miles west of Philadelphia. It was founded by English Quakers in 1726. A railroad bridge over a mile in length connects Columbia with Wrightsville, on the opposite bank of the Susquehanna. It is a large manufacturing center, having extensive rolling mills, foundries, oil refineries, saw mills, flour mills, tanneries, gas and water works, and manufactories of steam engines and railroad iron. Population in 1880, 8,312; in 1890, 10,598.

COLUMBIA, a city and capital of South Carolina, and county-seat of Richland county (see *Britannica*, Vol. VI, p. 168). The city, which has long been famed for its beauty, is built on a plateau about 200 feet above the Congaree River, affording a magnificent view of the surrounding country. It is about two miles square, regularly laid out with broad streets, several of them 100 feet wide, handsomely shaded, with macadamized roadways and paved sidewalks. The State House is built of granite, three stories high, and cost \$3,000,000. The United States court-house and postoffice, also of granite, and the new city hall are handsome buildings. The South Carolina University, which was organized as a college in 1806, was in 1880 re-organized with two branches, the South Carolina Agricultural and Mechanical College at Columbia, for whites, and Claflin University at Orangeburg, for blacks. Other educational institutions are a Presbyterian theological seminary, several academies for the education of both sexes, and excellent public schools. The Roman Catholics also have a school, the Ursuline Convent. There is a library containing 30,000 volumes belonging to the University. The city was founded in 1787, and became the capital of the State in 1790. It suffered a destructive conflagration in 1865. Population in 1880, 10,036; in 1890, 14,508.

COLUMBIA, the county-seat of Maury county, Tenn., on Duck River. The city is the seat of Jackson College, and has two seminaries for young ladies. It has a stock yard, a grain elevator and flour mills.

COLUMBIA, BRITISH. See CANADA, *Britannica*. COLUMBIA CITY, a city of Indiana, county-seat of Whitley county, situated on Blue Creek, 20 miles west of Fort Wayne. It contains manufactories of flour, lumber and woolen goods.

COLUMBIA COLLEGE. See COLLEGES, in these Revisions and Additions.

COLUMBIAN EXPOSITION (1893). See WORLD'S FAIR, in these Revisions and Additions.

COLUMBIDÆ, a family of birds. See DOVE, *Britannica*, Vol. VII, p. 379.

COLUMBINE, the common name of plants of the genus *Aquilegia*, natural order *Ranunculaceæ*; natives of the temperate and colder regions. *A. Canadensis* is a beautiful plant which grows wild in many parts of

the United States, but is cultivated with the greatest ease. It has terminal flowers, scarlet without and yellow within, pendulous, much embellished by the numerous descending, yellow stamens and styles.

**COLUMBRARIUM**, a particular kind of sepulchral chamber used by the Romans to receive the ashes of bodies which had been burned.

**COLUMBUS**, a city of Georgia, and county-seat of Muscogee county (see *Britannica*, Vol. VI, p. 171). Columbus is at the head of steam navigation from the Gulf of Mexico, a distance of 300 miles. It is connected with Macon, Ga., by the Southwestern Railroad, and is the terminus of the North and South Railroad. It is also on the Western, and the Mobile and Girard railroads. A change in the level of the Chattahoochee River at this point affords unlimited water power, which has fostered extensive manufacturing interests. The largest cotton and woolen mills in the South are located at Columbus, producing a great variety of colored goods, gingham, etc. The city contains an opera house, superior county buildings, churches, a high school, several graded schools, a female seminary, male academy, and several excellent hotels. The streets are broad, handsomely shaded, and well lighted. Population, in 1880, 10,123; in 1890, 18,650.

**COLUMBUS**, the county-seat of Bartholomew county, Ind., situated 41 miles southeast of Indianapolis, on the east fork of the White River.

**COLUMBUS**, a railroad junction and county-seat of Cherokee county, Kan., situated 50 miles south of Fort Scott.

**COLUMBUS**, a village of Kentucky, situated on the Mississippi River, twelve miles below Cairo. It is an important center of trade and transportation, and contains a variety of manufactories.

**COLUMBUS**, the county-seat of Lowndes county, Miss., on the Tombigbee River. It is the seat of a university and other educational institutions. It has a large cotton trade.

**COLUMBUS**, the county-seat of Platte county, Neb., on the Union Pacific Railway and the Platte River. The city has a high school and various manufactories.

**COLUMBUS**, a city and capital of the State of Ohio (see *Britannica*, Vol. VI, p. 170). Columbus is reached by no less than 15 different lines of railway, and has 30 miles of street railways, operated by both horse and electric power. It has an abundant supply of natural gas, which is largely used by manufacturers, as well as by private families, for fuel. Carriage manufacturing is the leading industry, one company manufacturing \$2,000,000 worth of goods annually. The area of the city is 12 square miles. Public parks cover 195 acres. The State University, United States Garrison, State Fair, Capitol, and other grounds, all fine parks, have a total area of 600 acres. A United States custom-house was established in Columbus in 1889, and transacted about \$1,000,000 worth of business in 1890. Population in 1880, 51,647; in 1890, 90,398.

**COLUMBUS**, the county-seat of Colorado county, Texas, situated on the Colorado River. Colorado College is located here.

**COLUMBUS**, a city of Columbia county, Wis., situated on Crawfish River.

**COLUMBUS**, CHRISTOPHER. See *Britannica*, Vol. VI, pp. 171-76.

**COLUMELLA**, the axis to which the carpels of a compound pistil are often attached, as in geranium, or which is left when a pod opens, as in azalea—also the central axis of the spore cases of mosses, and the central axis of spiral univalve shells.

**COLUMN**, in military evolutions, a mass of soldiers several ranks in depth, presenting a formation unlike that which arises from spreading them out

in line. There may be columns of regiments of battalions or of companies.

**COLWELL**, STEPHEN (1800-72), an American author. He was admitted to the bar in 1821 and practiced in Pittsburgh, Pa., for ten years. Subsequently he wrote for the press on his favorite topics of political and social science. During the civil war he was one of the foremost supporters of the national government in its struggle against secession, lending his time and money to the cause. After the war he was made a commissioner to examine the internal revenue system of the United States, and to this task he devoted much time and study. He wrote many valuable works on political economy.

**COLYMBIDÆ**, a family of web-footed birds. See *Diver*, *Britannica*, Vol. VII, p. 292.

**COMA**, a Greek word used in medicine to signify more or less profound insensibility, somewhat resembling sleep, from which the person cannot be easily roused.

**COMA BEREKES**, a small and close cluster of stars near the equinoctial colure, south of the tail of the Great Bear.

**COMANCHES**. See *Britannica*, Vol. VI, p. 177.

**COMB**, or **COOMB**, an old English corn-measure containing four bushels, or half a quarter. The name is often applied to hollows or valleys among hills.

**COMBATANTS**, in the armies of civilized nations, soldiers whose duty it is to fight both in attack and defense. They are either cavalry, artillery, engineers, or infantry. Non-combatants, on the other hand, perform administrative duties, and fight only in self-defense, though soldiers and armed as in the commissariat, transport, ordnance, store, medical, pay, and veterinary departments.

**COMET**. See *Britannica*, Vol. VI, pp. 182-93.

**COMET EYE-PIECE**, a celestial eye-piece with lenses of long focus and field-lens of large diameter.

**COMET-SEEKER**, a telescope with a low magnifying power, and a short focus as compared with the size of its object-glass. It has a wide field, and is employed to find comets.

**COMFORT**, GEORGE FISK, an American educator, born in Berkshire, Tompkins county, N. Y., in 1833. He graduated at Wesleyan University, and then studied in Europe. On his return to the United States in 1865 he was made professor of languages at Alleghany College, Meadville, Pa., and in 1872 became professor of æsthetics and modern languages at Syracuse University, Syracuse, N. Y. Among his publications is a series of textbooks for the German language.

**COMISO**, a town of Sicily, in the province of Syracuse. It has paper manufactories. Population, about 9,000.

**COMITY OF NATIONS**, a term given to that international courtesy by which effect is given to the laws of one nation within the territory and against the citizens of another nation.

**COMMA**, a small interval in the mathematical study of sound, generally corresponding to the vibration-ratio 81:80, which occurs between the two pitches of two notes, which, on the piano, organ and other tempered instruments, are represented by one only.

**COMMANDANT**, a commander; the commanding officer of a place, or of a body of men.

**COMMANDITE**, *SOCIÉTÉ EN*, or partnership in, an expression used in France to express a partnership in which one may advance capital without taking charge of the business.

**COMMEMORATION**, the great festival of the Oxford academic year, corresponding to the "Commencement" of American colleges.



**COMMENSURABLE.** Two quantities or numbers which are of the same kind, and each of which contains a third quantity or number a certain number of times without a remainder, are said to be commensurable.

**COMMENTREY,** a town in the French department of Allier, 211 miles south of Paris by rail. It is near a great coal-field, and owes its rise to coal and iron-works. Population, 9,233.

**COMMINATION,** a penitential office used in the Church of England after the Litany on Ash Wednesday, consisting of sentences taken from Deuteronomy xxvii and other passages of Scripture. To each sentence that is read, the congregation respond Amen.

**COMMISSARIAT,** a name for the organized system whereby armies are provided with provisions, forage, equipage, etc. The name is also applied to the body of officers employed in that department.

**COMMISSARY,** in general, any one to whom the power and authority of another are committed; in ecclesiastical law, an officer appointed by a bishop to exercise spiritual jurisdiction in remote parts of a diocese.

**COMMISSION,** a writing, generally in the form of a warrant, authorizing one or more persons to perform duties or exercise powers belonging to another, or to others. Instruments of delegation, bearing this title are issued by the government to officers in the army and navy, judges, justices of the peace, postmasters and others. Another class of commissions are those granted to a body of persons intrusted with the performance of certain special duties of a public or legal character.

**COMMISSIONNAIRES,** a class of attendants at hotels in continental Europe, who perform certain miscellaneous services, and attend at the arrival of railway trains and steamboats to secure customers, look after luggage, etc. A body of commissionnaires has been established in London, consisting of maimed soldiers who have retired with a pension.

**COMMISSION MERCHANT,** a person employed to sell goods on commission, consigned or delivered to him by another who is called his principal.

**COMMISSURE,** an anatomical term applied to nervous connections between adjacent parts of the nervous system.

**COMMONER,** one under the rank of nobility; also, a member of the House of Commons. The commoners at Oxford, are a class of students eating at the common table.

**COMMON FORMS,** the ordinary clauses which are of frequent occurrence in identical terms in writs and deeds.

**COMMONS AND COMMON LAW.** See *Britannica*, Vol. VI, pp. 208-10.

**COMMON SCHOOLS OF THE UNITED STATES.** The table on the following page gives the chief statistical educational summaries of the public and common schools as reported by the school superintendents of the States to the Educational Bureau at Washington, where they were duly tabulated and issued for the use of the public. They are for the year ending in 1889, and the latest furnished to the public at the date of this writing, April 1891.

**COMMON TIME,** in music, that species of measure which contains two minims or two crotchets in a bar.

**COMMUNICATION, PRIVILEGED,** a communication between such persons or under such circumstances that it does not involve an action for damages, or a communication between such persons and under such circumstances that the receiver cannot be called upon to produce it as an admission in a suit. The most common instance of such

privilege is in the case of a client and his legal adviser. In the United States members of the legal profession are privileged, and as a rule what a client communicates to them cannot be disclosed except the right of confidentiality be waived. The privilege is extended to the communications of several parties, or of their counsel and agents engaged on the same side of a cause, and made with a view to their joint prosecution or defense. Interpreters stand in the same relation as attorneys.

Confessions made to a clergyman or priest in some States are privileged by statute, but generally it is otherwise. By a statute of the State of New York, ministers of the Gospel and priests of every denomination are forbidden to disclose confessions made to them in their professional character, and in the course of discipline enjoined by the Church. Similar statutes exist in Missouri, Wisconsin, Michigan and Iowa. Communications made to a physician are in some States privileged, and in others not. Communications between husband and wife are privileged from disclosure.

In England no special privilege is extended to the Roman Catholic confessional, and the question as to how far a confession made to a clergyman for the purpose of obtaining spiritual comfort and consolation is protected was long considered doubtful. The rule has, however, been established for some time that clergymen are not entitled to the same privilege as legal advisers; in Scotland the point has never been decided. In England communications to a medical man, even in the strictest professional confidence, are not protected from disclosure; and the same is the case in Scotland. For communications involving no liability for defamation, see *LIBEL*, *Britannica*, Vol. XIV, p. 506.

**COMMUNISM.** See *Britannica*, Vol. VI, pp. 211-19.

**COMNENUS,** the name of a family, originally Italian, of which many members occupied the throne of the Byzantine empire from 1057 to 1204, and that of Trebizond from 1204 to 1461.

**COMO,** a town of Colorado, and an important railroad junction, situated at the head of Kenosha Pass. It is surrounded by extensive coal mines.

**COMODO,** an island of the Malayan Archipelago. It is 35 miles in length and 16 miles in width, and occupies nearly the entire width of the strait, which separates the islands of Sambawa on the west and Flores on the east.

**COMORIN CAPE,** the most southerly extremity of India, in 8° 4' 20" north latitude, and 77° 35' 35" east longitude.

**COMPANY** in military organization, that part of a battalion which constitutes a captain's command. It is both a tactical and administrative unit, and is divided into two sections or two subdivisions.

**COMPANY,** all the persons engaged on board a ship, including naval officers as well as crew.

**COMPARETTI, DOMENICO,** philologist, born June 27, 1835, at Rome. In 1859 he was appointed to the chair of Greek in the University of Pisa, which he exchanged a few years later for the same position in the Instituto di Studi Superiori at Florence. He was a frequent contributor to the learned journals, and author of works on Greek dialects in South Italy, Virgil the Magician, and Homer and Pisistratus. With D'Ancona he edited the invaluable *Canti et Racconti del Popolo Italiano* (1869).

**COMPENSATION OF ERRORS,** in physics, a method of neutralizing errors which cannot be avoided, by introducing others into the experiment or observation, of an opposite nature, and equal in amount. The compensation pendulum illustrates the principle.

## PUBLIC SCHOOL STATISTICS.

| STATES AND TERRITORIES.   | School Age. | School Pop'l'n. | Number Enrolled in Public Schools. | Average Daily Attendance. | Average Duration of Schools in Days. | Salaries of Superintendents and Teachers. | Total Expenditures. |
|---------------------------|-------------|-----------------|------------------------------------|---------------------------|--------------------------------------|-------------------------------------------|---------------------|
| Alabama.....              | 7-21        | 522,691         | 270,204                            | 172,101                   | 75.75                                | \$576,898                                 | \$750,000           |
| Arizona.....              | 6-18        | b 10,303        | 6,617                              | 3,849                     | 185                                  | 105,866                                   | 130,212             |
| Arkansas.....             | 6-21        | 404,379         | 216,152                            | c 141,500                 | c 75                                 | d 830,041                                 | 967,609             |
| California.....           | 5-17        | 275,802         | 215,905                            | 133,738                   | 160.4                                | 3,409,457                                 | 5,063,131           |
| Colorado.....             | 6-21        | 85,824          | 59,513                             | 35,567                    | 170                                  | 855,937                                   | 1,506,143           |
| Connecticut.....          | 4-16        | 167,243         | 127,080                            | 82,382                    | 180.32                               | 1,325,945                                 | 1,984,354           |
| Dakota.....               | 7-20        | e 116,129       | 98,826                             | 53,211                    | 106                                  | 988,720                                   | 1,790,968           |
| Delaware.....             | 6-21        | f 43,538        | g 32,552                           | 21,271                    | 161                                  | 202,893                                   | 246,718             |
| District of Columbia..... | h 6-17      | c 52,590        | 35,764                             | 27,619                    | 181                                  | 470,110                                   | i 944,640           |
| Florida.....              | 6-21        | c 119,090       | 86,008                             | 63,652                    | 150                                  | j 450,000                                 | 500,000             |
| Georgia.....              | 6-18        | c 569,375       | 321,176                            | 217,896                   | j 68.4                               | 706,760                                   | 869,005             |
| Idaho.....                | 5-21        | e 24,071        | 12,678                             | c 8,240                   | g 80                                 | 95,000                                    | 160,580             |
| Illinois.....             | 6-21        | 1,133,867       | 763,411                            | 500,736                   | 148                                  | 6,014,388                                 | 11,015,068          |
| Indiana.....              | 6-21        | 770,875         | 523,147                            | 350,752                   | 132                                  | 4,086,199                                 | 4,957,626           |
| Iowa.....                 | 5-21        | 649,606         | 489,229                            | 304,856                   | 154                                  | 4,197,165                                 | 6,483,397           |
| Kansas.....               | 5-21        | 524,206         | 405,454                            | 244,697                   | 128                                  | 2,986,904                                 | 5,137,461           |
| Kentucky.....             | 6-20        | e 664,967       | k 330,986                          | l 222,554                 | 94                                   | 1,716,551                                 | 2,153,178           |
| Louisiana.....            | 6-18        | 336,137         | 125,578                            | 90,551                    | 98                                   | 495,391                                   | 544,269             |
| Maine.....                | 4-21        | 212,064         | 143,113                            | 98,641                    | 111.5                                | 718,000                                   | 1,232,930           |
| Maryland.....             | 5-15        | e 367,785       | 863,166                            | 270,851                   | 171                                  | n 5,580,703                               | 7,510,719           |
| Massachusetts.....        | 5-20        | 640,069         | 423,604                            | c 279,900                 | 152                                  | 3,193,535                                 | 4,952,524           |
| Michigan.....             | 5-21        | (m)             | 273,814                            | 111,641                   | 126                                  | 2,145,258                                 | 3,981,215           |
| Minnesota.....            | 5-21        | b 463,964       | 319,711                            | 193,119                   | o 91                                 | 963,976                                   | 1,115,808           |
| Missouri.....             | 6-20        | 865,384         | 611,541                            | 376,977                   | 141.3                                | d 3,220,264                               | 4,552,463           |
| Montana.....              | 4-21        | e 27,600        | 13,828                             | c 8,800                   | 127                                  | j 215,000                                 | p 317,442           |
| Nebraska.....             | 5-21        | 310,505         | 232,244                            | 159,692                   | 114                                  | d 1,801,852                               | 3,419,721           |
| Nevada.....               | 6-18        | q 9,789         | 7,611                              | 5,149                     | 170                                  | d 135,308                                 | 168,852             |
| New Hampshire.....        | 5-21        | (r)             | s 60,124                           | 43,484                    | 113.9                                | 501,174                                   | 779,073             |
| New Jersey.....           | 5-18        | e 387,847       | 224,398                            | 135,187                   | 192                                  | u 2,525,425                               | 3,115,441           |
| New Mexico.....           | 5-20        | (r)             | c 16,484                           | c 12,300                  | j 67.2                               | d, j 74,400                               | j 145,400           |
| New York.....             | 5-21        | 1,803,667       | 1,033,813                          | 637,487                   | 178                                  | 9,978,004                                 | 16,050,245          |
| North Carolina.....       | 5-21        | e 580,819       | 337,332                            | 206,657                   | 63.4                                 | 571,034                                   | c 700,000           |
| Ohio.....                 | 6-21        | 1,130,537       | 777,162                            | 508,492                   | 165                                  | 6,760,398                                 | 10,093,706          |
| Oregon.....               | 4-20        | 95,098          | 56,696                             | 40,012                    | o 109                                | 521,681                                   | 752,693             |
| Pennsylvania.....         | (m)         | 954,409         | 687,355                            | 419,8                     | d 4, 6, 669,798                      | t 11,902,261                              |                     |
| Rhode Island.....         | h 5-15      | 64,905          | 51,895                             | 33,803                    | 189                                  | 573,413                                   | 907,287             |
| South Carolina.....       | (m)         | 194,264         | 136,358                            | 86                        | a 420,117                            | a 460,434                                 |                     |
| Tennessee.....            | 6-21        | c 652,508       | v 436,524                          | g 308,969                 | 79                                   | 2,990,709                                 | 1,137,803           |
| Texas.....                | 8-16        | 545,616         | a, c 440,467                       | a 340,000                 | 112                                  | 2,606,642                                 | 3,483,452           |
| Utah.....                 | 6-18        | 53,492          | 34,321                             | c 19,750                  | 135                                  | 185,899                                   | 284,856             |
| Vermont.....              | (m)         | 68,453          | 46,061                             | 31                        | 137                                  | 483,426                                   | 650,292             |
| Virginia.....             | 5-21        | w 610,271       | 336,948                            | 195,525                   | 119                                  | 1,289,069                                 | 1,620,809           |
| Washington.....           | 5-21        | 70,846          | 46,751                             | 29,247                    | 92                                   | 814,594                                   | 655,111             |
| West Virginia.....        | 6-21        | 258,934         | 187,528                            | 119,990                   | a 102                                | 812,728                                   | 1,307,904           |
| Wisconsin.....            | 4-20        | 576,967         | 344,942                            | 186,881                   | 162.4                                | d 2,414,281                               | 3,655,012           |
| Wyoming.....              | (m)         | 5,622           | 3,750                              | c 2,750                   | x 119                                | d 84,968                                  | j 118,908           |
| Total.....                |             |                 | 12,291,259                         | 8,004,275                 | 134.5                                | \$87,888,666                              | \$132,129,600       |

a In 1887-88.

b In 1887.

c Approximately.

d Salaries of teachers only.

e In 1888.

f In 1886.

g In 1886-87.

h Inclusive.

i Also \$5,046 were expended for even-  
ing schools.

j Estimated.

k Highest number in attendance; no  
report from Bell county.

l Bell county not reporting.

m No school census.

n Including fuel and janitor's  
wages.

o Country schools only.

p Amount of revenue.

q In 1889.

r School census imperfect.

s Number who have attended two  
weeks or more.

t Including debt paid.

u Revenue for "maintaining the  
schools."v A few counties not reporting are  
estimated.

w In 1885.

x In 1880.

COMPETITION, the act of endeavoring to gain what another endeavors to gain at the same time. In political economy, it is simply the form taken by the struggle for existence as applied to industry.

COMPLEMENT, in music, the quantity required to be added to any interval to complete the octave; for example, a fourth is the complement of a fifth, etc.

COMPLEMENT, that which completes or makes up a given magnitude to some fixed magnitude. It is most commonly used in mathematics to signify the arc or angle by which a given arc or angle falls short of a quadrant or right angle.

COMPONE, or GOBONY: in heraldry, a bordeur, pale, bend, or other ordinary, made up of two rows of small squares, consisting of alternate metals and colors.

COMPOSITION, in bankruptcy, a certain percentage which creditors agree to receive from a bankrupt in lieu of full payment of his debts, and the acceptance of which operates as a discharge to the bankrupt.

COMPOSITION, in art, such an arrangement of the separate objects represented as that they shall all manifestly tend to bring out the idea which animates the whole.



**COMPOSTS**, manures consisting of mixtures of substances which are adapted to the fertilization of the soil, and which, being allowed to ferment and undergo chemical changes for a considerable time, become very valuable.

**COMPOUND**, the usual name in India for the inclosure in which a house stands, with its outhouses, yard and garden.

**COMPOUND ANIMALS**, those animals in which individuals distinct as to many of the powers of life are yet united in some part of their frame, so as to form one living system. Examples of this union are found in many animalcules and zoophytes, also in cestoid worms and ascidian mollusks.

**COMPOUND COMMON TIME**, in music, that species of measure which contains the value of two dotted minims in a bar. Compound triple time denotes a measure of nine crotchets or quavers in a bar.

**COMPRESSED AIR BATHS**, a strong chamber of riveted iron plates, in which two or more persons can sit, and into which air is driven by a steam-engine to any required pressure. The inflow of fresh air and the escape of the foul air are regulated by valves. Patients remain in the bath from one to three hours, and the pressure is generally increased to an atmosphere and a half. Another appliance for using either compressed or rarefied air consists of a mask tightly covering mouth and nose, and connected by a tube and suitable valves with some form of air-cistern, in which the pressure can be varied as desired. By this appliance patients can either inspire compressed or rarefied air, or can breathe out into either of these. The general effects of compressed air are to lessen the frequency of the movements of the chest, and of the heart or pulse-beats, while allowing the absorption of more oxygen, and increasing the blood-tension. Rarefied air produces the opposite effects.

**COMRIE**, a village of Perthshire, 20 miles west of Perth. It lies amid a very picturesque scenery of clay-slate band of Scotland. Its industries are distilling, and woolen and cotton weaving. Population, 1,611.

**COMPTON, BARNES**, a farmer, born in Port Tobacco, Md., Nov. 16, 1830. He graduated at Princeton in 1851. He was elected a member of the State House of Delegates from Charles county in 1860 and 1861, and of the State Senate in 1867, 1868, 1870 and 1872, serving as its president in 1868 and 1870. Was six times elected State Treasurer of Maryland, holding the office 11 years, two months, when he resigned. In politics he was a Democrat, and was elected a representative from the Fifth Congressional District of Maryland to the 49th and 50th Congresses. He was declared reelected to the 51st Congress, but was unseated by the House of Representatives. He was elected in 1890 to the 52nd Congress from the same district.

**COMPTROLLER**, a government officer of the United States Treasury Department; also an officer of a State, county, or municipality, whose duties are specially connected with the fiscal affairs. See **BANKING SYSTEM IN THE UNITED STATES**, in these Revisions and Additions.

**COMPURGATORS**, twelve persons whom Anglo-Saxon law permitted the accused to call in proof of his innocence, and who joined their oaths to his. They were persons taken from the neighborhood, or otherwise known to the accused. It was rather in the character of witnesses than of jurymen that they acted, though the institution has been spoken of as the Anglo-Saxon jury; what they swore to was not so much their knowledge as their belief. The number of compurgators varied with the rank of

the parties and the nature of the accusation, but was usually twelve. The system of compurgators was adopted even in civil actions for debt. Compurgation, which was a custom common to most of the Teutonic races, fell into disuse after the Conquest, but the ceremony of what was called canonical purgation of clerks-convict was not abolished in England till the reign of Elizabeth.

**CON**, or **COL**, an Italian particle, meaning "with," much used in musical terms, as "con spirito," "con brio."

**CONACRE**, a custom of letting land in Ireland in small portions for a single crop, the rent being paid either in money or in labor.

**CONANT, THOMAS JEFFERSON**, an American Biblical scholar, born in 1802. In 1825 he became tutor in Columbian College, Washington, D. C., and in 1827 professor of Greek, Latin, and German in Waterville College, Me. In 1835 he became professor of languages and Biblical literature in Madison University at Hamilton, N. Y., and held this position till 1851, when he accepted the chair of Hebrew and Biblical exegesis in Rochester Theological Seminary. He resigned in 1857 to accept from the American Bible Union the office of reviser of the common English version of the Bible, continuing in this service till 1875. He is conceded to be one of the first Hebraists of the age. He has written numerous important works on Biblical subjects.

**CONCAVE**. A surface is said to be concave when straight-lines drawn from point to point in it fall between the surface and the spectator, and convex when the surface comes between him and such lines.

**CONCENTAINA**, a town of Valencia, Spain, situated on a slope of the Sierra Mariola. It has manufactories of linen, woolen, paper, soap, etc. Population, 6,600.

**CONCEPTION**. See *Britannica*, Vol. XX, pp. 57, 76, and 407.

**CONCEPTION OF OUR LADY**, an order of nuns, founded in Portugal in 1484 by Beatrix de Sylva, in honor of the immaculate conception. It was confirmed in 1489 by Pope Innocent VIII. Cardinal Ximenes put the nuns under the direction of the Franciscans, and imposed on them the rule of St. Clare. The order subsequently spread into Italy and France.

**CONCEPTUALISM**. See *Britannica*, Vol. I, p. 35; and Vol. XXI, p. 424.

**CONCERT**, a public performance of concerted pieces, symphonies, etc., sometimes interspersed with songs.

**CONCERTINA**, a musical instrument whose sounds are produced by free vibrating springs of metal, as in the accordion. The scale of the concertina is very complete and extensive, beginning with the lowest note of the violin, G, and ascending chromatically for four octaves.

**CONCERTO**, a musical composition for two or more solo instruments, with orchestral accompaniments. Innumerable concertos have been written for the piano-forte, among which compositions of the most masterly kind are to be found.

**CONCH**, a marine shell, especially of the *Strombus gigas*. Also a spiral shell probably of the kind now constituting the genus *Triton*, said to have been used by the Tritons as a trumpet, and still used by some African peoples in war. The native whites of the Bahamas are called conchs from their common use of the flesh from Conchs as food.

**CONCHIFERA**, in Lamarck's arrangement of mollusks, a class containing those which have bivalve shells—*Lamellibranchiata* and *Brachiopoda*.

**CONCHOID**, or **NICOMEDES**, a curve invented by Nicomedes, about the 2nd century before Christ,

with the view of trisecting an angle, of constructing two geometrical means between two given straight lines, and of "doubling the cube." The curve is frequently used in architecture as a bounding line of the vertical section of columns.

**CONCHOLOGY**, that branch of natural history which deals with the shells of mollusks. From the time of Aristotle the beauty and variety of these structures have made them favorite objects of study, and few zoological subjects have excited so much popular enthusiasm. The study often became unscientific, and sometimes a craze. Since the shells are only external coverings, and were seldom considered in relation to their tenants, or in connection with the internal and external influences to which they owe their shapes, conchology has been somewhat barren of scientific results.

**CONCIERGE**, the French name for a door-keeper or janitor of a house, hotel, or public edifice. In French towns, where a large portion of the population lives in flats, the common door by which many households have access to their several tenements is usually under the charge of a concierge, who exercises a general supervision over all who pass.

**CONCORD**, the simultaneous sounding of tones that are in harmony with one another, whether consonant or dissonant.

**CONCORD**, a town of Massachusetts. See *Britannica*, Vol. VI, p. 240; and Vol. XXIII, p. 740.

**CONCORD**, a city and capital of New Hampshire, and county-seat of Merrimac county (see *Britannica*, Vol. VI, p. 240). The Merrimac River divides the city into two portions, which are connected by seven bridges, three of them railroad bridges. The streets are wide, well paved and lighted. The chief educational institutions are St. Paul's (Episcopal) school, a public high school, and several graded schools. It has also a public library, and a State library, containing 11,000 volumes. Its principal public buildings are the State House, built of granite, city hall, State prison, two orphanages, a home for the aged, and a State insane asylum. Concord has many fine hotels and extensive manufacturing interests, but is chiefly noted for its valuable granite quarries. Population in 1880, 13,843; in 1890, 16,948.

**CONCORD**, the county-seat of Cabarrus county, N. C. It has academies for boys and also for girls, a cotton factory and machine shops.

**CONCORDIA**, a town of the Argentine State of Entre Rios, on the Uruguay, 302 miles north of Buenos Ayres by river. It has a custom-house and a river trade exceeded only by that of Buenos Ayres and Rosario. Population, 10,000.

**CONCORDIA**, a railway city and the county-seat of Cloud county, Kan. It is on Republican River and has a fine water-power, which is applied in various factories or mills, where flour, wagons, plows and cigars are made. There are several schools and seminaries in the city, and also a United States land office.

**CONCRETE**. See *Britannica*, Vol. IV, pp. 753-56; Vol. VI, p. 243, and Vol. XX, p. 808.

**CONCRETE**, a term in logic opposed to abstract. A concrete notion is the notion of an object as it exists in Nature, invested with all its qualities; an abstract notion is the notion of any attribute, having qualities which may be thought of independently of the objects in which it adheres.

**CONCRETION**, in pathology, a formation of solid unorganized masses within the body, either by chemical precipitation from the fluids, or by the accidental aggregation of solids introduced into the system from without. In the former case, a con-

cretion is termed a *calculus*. Perhaps the most remarkable concretions are those formed in the stomach and intestines of man and the lower animals from the more solid and indigestible parts of the food, or of substances improperly swallowed.

**CONCRETIONARY STRUCTURE**, a condition in rocks produced by molecular aggregation subsequent to the deposition of the strata, whereby the material of the rock is formed into spherules or balls, as in the grains of oolitic limestone, or the larger concretions of magnesian limestone.

**CONCURRENT**, a technical term for the person who accompanies a sheriff's officer as witness or assistant.

**CONCUSSION OF THE BRAIN**, in medicine, one form of shock—that, namely, where the symptoms are due to an injury which has shaken or jarred the brain and stunned the patient, without producing any mechanical injury, so far as can be ascertained to the brain or skull. It is generally believed that concussion alone can produce severe symptoms and even death. It is apt to occur from a severe blow or fall on the head.

**CONCUSSION OF THE SPINAL CORD**, in medicine, a form of shock acting upon the vertebral column.

**CONDIMENTS**, substances employed at the table for the purpose of imparting flavor or seasoning to food.

**CONDITION**, in law, a declaration or provision that upon the occurrence of an uncertain event an obligation shall come into force, or shall cease, or that the obligation shall not come into force until a certain event. Such conditions are known, respectively, as precedent or subsequent, resolute, and suspensive.

**CONDITION**, in logic, that which must precede the operation of a cause. It is not regarded as that which produces an effect, but as that which renders the production of one possible. For instance, when an impression is made on wax by a seal, the seal is said to be the cause; the softness, or fluidity of the wax, a condition.

**CONDONATION**, a legal term used to express the act or course of conduct by which a husband or wife is held to have pardoned a matrimonial offense of which the other has been guilty. Thus, if a wife voluntarily cohabits with her husband after she has discovered that he has been guilty of adultery she is held to have condoned the offense, and such condonation is a bar to an action for divorce.

**CONDUCTOR** in music, a name given to the leader of a modern orchestra.

**CONDURANGO**, the name of several asclepiadaceous woody climbers of South America, whose bark affords a drug used as a remedy for venomous bites. The plant is usually referred to *Marsdenia condurango*. Also written *cundurango*. It had a brief reputation as a cure for cancer.

**CONDYLE**, in anatomy, a protuberance on the end of a bone, serving for articulation with another bone, more especially applied to that by which the occipital bone of the skull is articulated to the spine.

**CONE**, in botany, a fruit-bearing spike covered with scales, as in the hop, but more especially in the fir, spruce and pine, the upper side of each scale containing two seeds.

**CONEMAUGH FLOOD**, a name given to one of the most sudden and disastrous floods known in American history. It occurred in Johnstown, Pa., and vicinity in the afternoon and night of May 31, 1889. About ten miles above Johnstown, on the South Fork Creek, a little above its junction with the Conemaugh River, was a dam owned by the "South Fork Fishing and Hunting Club," an organ-



ization of wealthy men, most of them residents of Pittsburgh. By means of that dam the water of the creek and upper watershed had been accumulated, forming an immense reservoir, bearing the name of "Conemaugh Lake," stored with fish. As the result of great rains the dam gave way and the free waters were added to the already swollen current below, the whole rushing down the valley with the speed of a race-horse, sweeping away most of the hamlets and villages of Woodvale, Conemaugh, South Fork, Mineral Point, Morrellville, and large villages of Cambria City and Johnstown—the whole borough familiarly called "Johnstown City." In the census of 1880, Johnstown reported a population of 8,380, which had rapidly increased until, at the date of the flood, it had embraced about 10,000, and with the hamlets and villages an estimated total of from 20,000 to 25,000. The wreckage of hamlets, villages, manufactories, stations and other buildings of the Pennsylvania, and Baltimore and Ohio railways, business houses, hotels library and school buildings, churches and homes of the people, with their contents, was nearly complete. The loss of life in the valley reached a total of 2,142 (923 males and 1,219 females); the widows left by flood, 124; widowers, 198; and orphans and half orphans, 5,650; 99 entire families were lost. The suddenness and extent of the disaster reminded the spectator and readers of the appalling story of Herculaneum and Pompeii.

The final report of the "Flood Relief Commission," presented July 28, 1890, furnished the following figures: "The total cash contributions, so far as the Commission was able to obtain information, were \$4,116,801.68. Of this amount, \$2,912,346.30 passed through the hands of the Relief Commission, divided as follows: Contributions sent to Governor Beaver, \$1,236,146.45; contributions disbursed by Philadelphia Permanent Relief Committee, \$600,000; by Pittsburgh Relief Committee, \$560,000; by New York Relief Committee, \$518,199.48. The expenditures by the Commission were \$2,845,140.83, of which \$2,592,936.68 went to the relief of the Cone-maugh Valley, \$246,475.26 to the relief of other portions of the State, and \$5,728.89 for general and office expenses."

**CONE-SHELL**, the shell of a mollusk of the genus *Conus*, family *Conidae*. The mollusks of this genus, which are carnivorous, inhabit the shores and banks of sandy mud, chiefly within the tropics. The shell has a remarkable conical form. Cone-shells first appear in the chalk, and become more abundant in the more recent formations.

CONEY ISLAND, a narrow strip of sand, five miles long by one-half mile broad, barely separated from the southwest angle of Long Island, at the entrance to New York harbor. It has a fine beach, and is a place of summer resort. On the edge of the dunes stands a long row of enormous hotels, and farther inland is a seaside home for poor children. Other structures are a tubular iron pier (1,000 feet), a look-out tower (300 feet), and a great number of bathing pavilions.

CONFECTIONERY. See *Britannica*, Vol. VI, pp. 256-57.

CONFEDERATE STATES. See Britannica, Vol. XXIII, pp. 773, *et seq.*

CONFERVA, a genus of the natural order *Algae*. The plants consist of simple or branching jointed filaments, filled with green matter, and are found some in fresh and some in salt water.

**CONFESSION**, in law, the admission of guilt made by a person who has committed a crime or misdemeanor. In the United States and in England confessions are conclusive against the parties making them, provided they have been made with

out any promise or threat held out as an inducement.

**CONFISCATION**, the act of appropriating without compensation private property to the public use; also, the act of seizing by authority property improperly obtained or held; as, to confiscate a set of burglar's tools, or a set of gambling implements. When the goods of a criminal are declared forfeited and adjudged to the public treasury they are said to be confiscated. By the terms of an act of Congress, passed in 1861, all property used for insurrectionary purposes was declared confiscated. In some European countries confiscation of the estates of an offender has been imposed as a punishment for certain political offenses.

CONGLOMERATE. See GEOLOGY, Britannica, Vol. X, p. 237.

CONGO FREE STATE. See under AFRICA, in these Revisions and Additions.

CONGREGATIONALISM. See Britannica, Vol. VI, pp. 268-69. See also RELIGIOUS DENOMINATIONS IN THE UNITED STATES, in these Revisions and Additions.

CONGRESSIONAL APPOINTMENTS The first article of the Constitution of the United States provides that the number of Representatives in Congress shall not exceed one for every 30,000 of the population, but each State shall have at least one Representative. The ratios of representation for the Congressional elections held during the several decades and subsequent to the action of Congress (after each census), fixing such ratio, were as follows:

| From | 1790 to | 1792 as provided by the Constitution..... | 30,000.  |
|------|---------|-------------------------------------------|----------|
| "    | 1792 to | 1803 based on the Census of 1790.....     | 33,000.  |
| "    | 1803 to | 1813 " " " " " "                          | 33,000.  |
| "    | 1813 to | 1823 " " " " " "                          | 35,000.  |
| "    | 1823 to | 1830 " " " " " "                          | 36,000.  |
| "    | 1833 to | 1843 " " " " " "                          | 47,700.  |
| "    | 1843 to | 1853 " " " " " "                          | 70,680.  |
| "    | 1853 to | 1863 " " " " " "                          | 93,420.  |
| "    | 1863 to | 1873 " " " " " "                          | 127,381. |
| "    | 1873 to | 1880 " " " " " "                          | 151,913. |
| "    | 1883 to | 1893 " " " " " "                          | 173,901. |

See also ELECTORAL VOTES, in these Revisions and Additions.

CONGRESS OF THE UNITED STATES. See  
Britannica, Vol. XXIII, pp. 749, *et seq.*

CONGREVE, RICHARD, an English author, born Sept. 4, 1818, and educated under Arnold at Rugby, passing afterwards to Wadham College, Oxford, of which he became successively scholar, fellow, and tutor, but resigned after having become definitely a disciple of Comte. In 1855 he published a good edition of Aristotle's *Politics*. Later works are: *Lectures on the Roman Empire of the West* (1855); *Elizabeth of England* (1862); *Essays, Political, Social and Religious* (1874).

CONGRUITY, a term applied in geometry to lines and figures which exactly correspond when laid over one another. See COINCIDENCE, in these Revisions and Additions.

CONFIFERÆ. See Britannica, Vol. II, pp. 315, 321; Vol. IX, p. 222; Vol. XIX, p. 102; Vol. XXIV, p. 131.

**CONIROSTRES**, a tribe or section of the order of birds called *Insesores*, and characterized by a strong conical bill. The number of birds belonging to this tribe is very great, and the families differ much in many respects. Among them are finches, sparrows, larks, linnets, American orioles, crows, birds of paradise, etc.

CONJUGATION, a term in grammar applied to a connected view or statement of the inflectional changes of form that a verb undergoes in its various relations.

**CONJUGATION OF CELLS**, a union of two distinct cells of a plant, in order to reproduce. It has been observed only in the *Confervaceæ* and *Diatomaceæ*.

**CONJUNCTION**, in astronomy one of the aspects of the planets. Two heavenly bodies are in conjunction when they have the same longitude; that is, when the same perpendicular to the ecliptic passes through both. The sun and moon are in conjunction at the period of new moon. In general a heavenly body is in conjunction with the sun when it is on the same side of the earth and in line with the sun.

**CONKLING**, Roscoe, a United States Senator, born in Albany, N. Y., Oct. 30, 1829, died in New York city, April 18, 1888. He began the practice of law in 1846, and in 1850 became district attorney of Oneida county, N. Y. He was elected mayor of Utica in 1858, and in November of the same year was chosen as a Republican to Congress. In 1860 he was reelected, but two years later was defeated by Francis Kernan. He defeated Kernan, however, in 1864. He received a reelection in 1866, and in January of 1867 was chosen United States Senator. Mr. Conkling was reelected in 1873 and 1879. In 1885-86 Mr. Conkling was counsel of the State senate investigating committee, appointed to look into the fraud and bribery in the grant of the Broadway, N. Y., horse-railroad franchise by the board of aldermen in 1884.

**CONN LOUGH**, a lake in the north of Mayo county, Ireland, and, with Lough Cullen, 13 miles long and 3 miles broad. To the west are hills stretching to Mount Nephin, which has a height of 2,646 feet.

**CONNARACEÆ**, a natural order of dicotyledonous or exogenous plants, consisting of trees and shrubs. Forty or fifty species are known, all tropical. The best known product of this order is the beautiful wood called "zebra wood" furnished by a large tree, *Omphalobium Lamberti*, a native of Guiana.

**CONNEAUT**, a railroad junction of Ashtabula county, Ohio, on Conneaut Creek, 2 miles from Lake Erie. It has a light-house, and as the creek makes a good harbor, Conneaut is a shipping point for produce.

**CONNECTICUT**. For the history, geography, productions, schools, map, and earlier statistics of the State of Connecticut, see *Britannica*, Vol. VI, pp. 285-89. The census of 1890 gives the area as 4,990 sq. miles; population, 746,258; capital, Hartford, with a population of 53,182, an increase since 1880 of 11,167; population of the State in 1880, 622,700; net increase of the State since 1880, 123,558. The following table gives the population of the State by counties for 1880 and 1890:

| Counties.        | 1890.   | 1880.   | Increase. |
|------------------|---------|---------|-----------|
| Fairfield .....  | 150,081 | 112,042 | 38,039    |
| Hartford .....   | 147,180 | 125,352 | 21,798    |
| Litchfield ..... | 53,542  | 52,944  | 1,498     |
| Middlesex .....  | 39,524  | 35,589  | 3,935     |
| New Haven .....  | 209,058 | 156,523 | 52,535    |
| New London ..... | 76,634  | 73,152  | 3,482     |
| Tolland .....    | 25,081  | 24,112  | 969       |
| Windham .....    | 45,158  | 43,856  | 1,302     |

Manufacturing forms the leading industry of the State. Though it ranks fifth in the amount of its manufactures, it holds the first place in respect of their variety. The State produces about one-half the rubber goods, more than one-half the hardware, and nearly all the clocks in the United States. Among the most important manufactures are

paper, firearms, carriages, cotton goods, woolen and silk fabrics, machinery, gunpowder, carpets, hosiery, furniture, sewing-machines, straw goods, saddlery, pianos, tools, buttons, pins, and many other things known as "Yankee Notions." Of the total area of the State about 1,700,000 acres are improved, and about 2,200,000 acres are unimproved. The census of 1890 shows a large increase in the population of its chief cities.

Its public school system has a deservedly high reputation, as also its higher educational institutions. Yale College, located at New Haven, is now attended by more than one thousand students. Middletown is also a widely-known educational center, and is the seat of Wesleyan University, one of the oldest Methodist Universities in America. It is also the seat of the Berkeley Divinity School. The total public school enrollment in the State in 1890, as shown by the census of that year, was 126,505 pupils—a gain over that of the census year, 1880, of 6.68 per cent. The gain in population during same period was 19.84 per cent. The aggregate number of teachers was 3,226, of whom 460 were males and 766 females. The parochial schools reported as follows: Catholic schools, nearly 13,000 pupils; Lutheran, a little over 400; Protestant Episcopal, only a few pupils.

For the population of its chief cities, see *CITIES*, *POPULATION*. The following is a complete list of the governors of the State to and including 1891:

|                        |           |                           |         |
|------------------------|-----------|---------------------------|---------|
| Samuel Huntington..... | 1785-96   | C. H. Pond.....           | 1853-54 |
| Oliver Wolcott.....    | 1796-98   | Henry Dutton.....         | 1854-55 |
| Jonathan Trumbull..... | 1798-1809 | Wm. T. Miner.....         | 1855-57 |
| John Treadwell.....    | 1809-11   | Alex. H. Holley.....      | 1857-58 |
| Roger Griswold.....    | 1811-13   | W. A. Buckingham.....     | 1858-66 |
| John Cotton Smith..... | 1813-18   | Joseph R. Hawley.....     | 1866-67 |
| Oliver Wolcott.....    | 1818-27   | James E. English.....     | 1867-69 |
| Gideon Tomlinson.....  | 1827-31   | Marshall Jewell.....      | 1869-70 |
| John S. Peters.....    | 1831-33   | James E. English.....     | 1870-71 |
| Henry W. Edwards.....  | 1833-34   | Marshall Jewell.....      | 1871-73 |
| Samuel A. Foote.....   | 1834-35   | Charles R. Ingersoll..... | 1873-75 |
| Henry W. Edwards.....  | 1835-38   | James E. English.....     | 1875-77 |
| Wm. W. Ellsworth.....  | 1838-42   | Richard D. Hubbard.....   | 1877-79 |
| C. F. Cleveland.....   | 1842-44   | Chas. B. Andrews.....     | 1879-81 |
| Roger S. Baldwin.....  | 1844-46   | Obart B. Bigelow.....     | 1881-83 |
| Isaac Toucey.....      | 1846-47   | Thomas M. Waller.....     | 1883-85 |
| Clark Bissell.....     | 1847-49   | Henry H. Harrison.....    | 1885-87 |
| Jos. Trumbull.....     | 1849-50   | Phineas C. Lounsbury..... | 1887-89 |
| Thos. H. Seymour.....  | 1850-53   | Morgan G. Bulkeley.....   | 1889-91 |

The following figures from the official reports of the crop census of 1888 show the acreage and yield of the State in respect of the various products named: Indian corn, 56,977 acres, yielding 1,778,000 bushels, valued at \$1,155,700; wheat, 2,149 acres, yielding 32,000 bushels, valued at \$38,400; rye, 28,500 acres, yielding 348,000 bushels, valued at \$257,298; oats, 39,811 acres, yielding 1,055,000 bushels, valued at \$453,650; barley, 638 acres, yielding 14,000 bushels, valued at \$9,876; buckwheat, 10,794 acres, yielding 134,000 bushels, valued at \$87,024; potatoes, 33,459 acres, yielding 2,677,000 bushels, valued at \$1,418,662; tobacco, 6,136 acres, yielding 9,603,000 pounds, valued at \$1,248,369; hay, 563,156 acres, yielding 574,419 tons, valued at \$8,443,959.

**CONNECTICUT RIVER**, The, rises in northern New Hampshire, and flows in a southerly direction, separating Vermont from New Hampshire, and crossing Massachusetts and Connecticut, it enters Long Island Sound at Saybrook. It is about 400 miles long, and is navigable 60 miles for boats drawing eight feet of water.

**CONNELLSVILLE**, a railroad junction of Fayette county, Pa., situated on the Youghiogheny River. The best coke in the world is manufactured here; bituminous coal is mined, and paper and woolen goods manufactured.

**CONNERSVILLE**, the county-seat of Fayette county, Ind., situated on Whitewater River. The city



has a handsome court-house and manufactories of woollens.

**CONNOISSEURS**, a French term used to designate persons who, without being themselves artists, are supposed to possess a discriminating knowledge of the merits of works of art.

**CONODONTS**, small fossils occurring in Palaeozoic strata. They are variable in form, and look very much like the teeth of different kinds of fishes, some being simple, slender-pointed sharp-edged cones, while others are more complex, resembling in form the teeth of certain sharks. Their affinities are very uncertain—it being maintained by some that they are minute teeth of fishes allied to the living hag-fishes and lampreys, and suggested by others that they have more analogy with the hooklets or denticles of annelids and naked mollusks.

**CONOID**, a solid formed by the revolution of a conic section round its axis; such are the sphere, paraboloid, ellipsoid, and hyperboloid.

**CONQUEST**, in the law of succession in Scotland, heritable property acquired during the life-time of the deceased, and called conquest, in opposition to that to which he has succeeded, and which is called heritage.

**CONQUISTADORES** (Sp., *conquerors*), a collective term for the conquerors of Spanish America, such as Cortes, Balboa, and Pizarro.

**CONRAD, ROBERT TAYLOR** (1810-58), an American lawyer. At an early age he was admitted to the bar, and in 1838 became judge of the criminal sessions for the city and county of Philadelphia. Later, he edited "Graham's Magazine," and afterwards was associate editor of the "North American." In 1854 he was elected mayor of Philadelphia, and in 1856 was appointed to the bench of the quarter sessions. He published considerably in both prose and poetry.

**CONSCIENCE**. See under **ETHICS**; see also *Britannica*, Vol. IV, p. 587; Vol. XII, p. 409; and Vol. XXI, p. 733.

**CONSCIENCE, COURTS OF, or COURTS OF REQUESTS**: in England, courts constituted by special acts of Parliament for the recovery of small debts.

**CONSCIOUSNESS**. See *Britannica*, Vol. XVI, p. 92; Vol. XIX, pp. 20, 41; and Vol. XX, p. 38. For different theories of consciousness, see *Britannica*, Vol. V, p. 142; Vol. VI, p. 525; Vol. XI, p. 417; and Vol. XIV, p. 758.

**CONSEGUANA**, a volcano of Nicaragua, occupying a promontory on the south side of Fonseca Gulf, about ten miles from the Pacific Ocean. The crater, at an elevation of about 4,000 feet above the mean level, is half a mile across, while its interior descends perpendicularly to a depth of 200 feet. Its last eruption occurred in 1835.

**CONSENT**, in law, the foundation of all contracts and legal obligations.

**CONSERVATOIRE**. See **CONSERVATORY**, *Britannica*, Vol. VI, p. 291.

**CONSERVATORS OF THE PEACE**, a title formerly applied in England to knights elected in each shire from the 12th century onwards for the conservation of the peace. They were, in fact, the predecessors of the justices of the peace.

**CONSERVES**, flowers, herbs, roots, fruit and seed, beaten with powdered sugar to the consistence of a stiff paste, so as to preserve them as nearly as possible in their natural freshness.

**CONSHOCKEN**, a town of Pennsylvania, situated on the Schuylkill River, about three miles below Norristown. It produces a variety of manufactures, including iron, cotton, and Phoenix stone, a material for building and pavements.

**CONSIDÉRANT**, VICTOR PROSPER, a French Socialist, born in 1808 at Salins, in the department of Jura. After being educated at the Polytechnic School of Paris he entered the army, which, however, he soon left to promulgate the doctrines of the socialist Fourier. In 1849 Considérant was accused of high treason, and compelled to flee from France. In Texas he founded a socialist community, *La Réunion*, which flourished for a time, but is now of little importance. Considérant returned to France in 1869.

**CONSIDERATION**, in legal contracts. See *Britannica*, Vol. VI, p. 322.

**CONSIGNMENT**, in mercantile law, the term applied to goods which are placed in the hands of an agent or factor for sale, or for some other specified purpose.

**CONSORT**, literally, one who throws in his lot with another. In English constitutional law, the term is applied to the husband or wife of the reigning sovereign, viewed not in a private but in a public capacity, as participating to a certain limited extent in the prerogatives of sovereignty.

**CONSPIRACY**. See *Britannica*, Vol. VI, pp. 293-94.

**CONSTABLE**. See *Britannica* Vol. VI, pp. 294-95.

**CONSTANT, BENJAMIN**, a French painter, born in Paris, June 10, 1845. He studied in the Ecole des Beaux-Arts, and under Cabanel, and first exhibited at the Salon in 1869, with his *Hamlet and the King*, which was purchased by the French government. He is best known for his treatment of Eastern subjects. Among the best of his works are: *Prisoners in Morocco* (1875); *Mahomet II* (1876); *The Harem* (1878); *The Favorite of the Emir* (1879); *The Day After a Victory in the Alhambra* (1882); and *The Vengeance of the Chérif* (1885). He is one of the most popular of contemporary French painters, and received medals in 1875 and 1876, and the decoration of the Legion of Honor in 1878.

**CONSTANT**, the name given in mathematical analysis to a quantity which remains the same for all cases of the problem in opposition to a variable. Thus, in questions about the fall of bodies in given times, the force of gravity is a constant quantity.

**CONSTANTIA**, a district of Cape Colony, South Africa, lying on the eastern and northeastern slopes of Table Mountain range. The district consists of three estates, High, Great, and Little Constantia, which have long been famed for the quality of the wines produced upon them.

**CONSTANTINE, NIKOLAYEVITCH**, grand-duke of Russia, the second son of the emperor Nicholas I, and the brother of Alexander II, born Sept. 21, 1827. During the Crimean war, he commanded the Russian fleet of the Baltic. On the outbreak of the Polish insurrection in 1862, he held the office of viceroy of Poland for three months, and was appointed in January, 1865, and reappointed in 1878 president of the council of the empire. In 1882 he was dismissed from this dignity, as well as the command of the fleet, on the suspicion of having intrigued with the revolutionary party, while his eldest son, Nicholas, was banished to Tashkend.

**CONSTIPATION**, an irregular and insufficient action of the bowels, due either to deficient secretion of fluids in the digestive organs, or to imperfect muscular action of the bowels, but usually to both these causes combined. The retention within the organism of matters which should be regularly evacuated as they are formed, and their consequent absorption into the blood and tissues of the body, often lead to a whole train of unpleasant symptoms: headache, or pain in other regions, irritability, lassitude, and debility.

CONSTITUTION OF THE UNITED STATES. See *Britannica*, Vol. XXIII, pp. 740, *et seq.*

CONSUETUDINARY, or CUSTOMARY LAW, an unwritten law established by usage, and derived by immemorial custom from remote antiquity. When universal, it is called common law; when particular, it is called custom in a narrower sense, as the custom of a trade, or of a district.

CONSUL. See *Britannica*, Vol. VI, pp. 315-17.

CONSUMPTION, in political economy, the use or expenditure of the products of labor, or of anything which has an exchangeable value.

CONTARINI, the name of a noble family in Venice, one of the twelve that elected the first doge. Between 1043 and 1674 eight doges were furnished by this family, which also counted among its members four patriarchs, and a large number of generals, statesmen, artists, poets and scholars.

CONTEMPT. See *Britannica*, Vol. VI, pp. 318-19.

CONTINGENT REMAINDER. See *Britannica*, Vol. XX, pp. 72-73.

CONTORTED STRATA, beds which are bent and twisted, so that in a section their edges follow crooked and curved lines.

CONTORNATE, a term applied to a class of antique medals, which have a deep line cut around the edge like a furrow.

CONTRA, in music, a term signifying opposite, lower, and applied to the alto and tenor parts when they form the lowest part in the harmony. When a part lower than the usual bass is employed, it is called *contra-basso*. *Contra* is also used in organ-building to indicate that a certain stop is an octave lower than the usual stop.

CONTRABAND. See *Britannica*, Vol. VI, pp. 320-22.

CONTRACT. See *Britannica*, Vol. VI, pp. 322-24.

CONTRALTO, the deepest or lowest species of musical voice in boys, in eunuchs, and, best of all, in women, where its beauty of tone gives it the preference. The powers of expression which it possesses are quite peculiar, and cannot be supplied by any other kind of voice. Its tone character (*timbre*) is serious, spiritual, tender, and romantic. *Contralto* voices generally consist of two registers, the lowest beginning at F or G below middle C, and reaching as high as the A or B above it. The higher notes up to the next F or G partake more of the character of the soprano.

CONTRAVENTION, in the law of Scotland, any act done in violation of a legal condition or obligation.

CONTRAVALLATION, LINES OF, a chain of works around a besieged place to resist the sorties of the garrison.

CONTRAYERVA "counter-poison," an aromatic bitterish root of different species of *Dorstenia*, of the natural order *Moraceæ*; a tropical American plant used as a stimulant and tonic.

CONTRIBUTION, in law, a payment made by each of several persons (having a common interest) of his share in a loss suffered, or in an amount advanced by any one of the partners for the common good. A suit for contribution in law is a suit brought by one or more of the several interested parties to compel the others to contribute their proportionate share.

CONVENTIONAL, in art, that which is in accordance, not with the absolute principles of beauty in form of color, but with opinions with regard to forms and colors which chance to prevail at a particular time, in a particular country, or social class.

CONVERGING, or CONVERGENT, applied in geometry to straight lines that meet or tend to

meet in a point; looked at in a direction from the point, they are divergent, or separating. Convergent and divergent are often used in reference to rays of light.

CONVERSION, a theological term applied to the conscious change of heart prompting the repentant sinner to a new life, which is part of the process of regeneration. Popularly the name means the sensible experience of this.

CONVERSION, in logic, signifies that one proposition is formed from another by interchanging the subject and predicate.

CONVEYANCING. See *Britannica*, Vol. VI, pp. 324-25.

CONVOY (Fr., *convoi*), a name given to one or more ships of war appointed to protect a fleet of merchant-vessels against the attacks of an enemy. If a merchant-ship parts company with a convoy, or neglects to obey the convoy's instructions or signals, all claims of insurance are forfeited. The name is sometimes applied to the merchant-vessel so escorted. In the military service a convoy is a train of wagons laden with provisions, treasure, or warlike stores, and escorted by a detachment of troops.

CONVULSIONARIES, a name given to a fanatical sect of Jansenists who sprang up in France about 1730. Their meeting-place was the churchyard of St. Médard, in a suburb of Paris, where was the tomb of a certain Francis of Paris, who died in 1727, and was reckoned very holy by the Jansenists on account of extravagant asceticism.

CONWAY, a river in North Wales, famous for the bold romantic scenery along its higher, as well as for the richly beautiful scenery along its lower course. It rises in a small mountain lake, around which meet the three counties of Merioneth, Denbigh and Carnarvon; it runs 30 miles northward past Llanrwst and Conway to Beaumaris bay. In its last 10 miles a smooth-flowing if winding stream, it is navigable for vessels of 100 tons. At Conway it is half a mile broad at spring-tides, which rise here from 21 to 24 feet. Pearl-mussels are found at its mouth.

CONWAY, HUGH, the pseudonym of Frederick John Fergus, an English novelist, born in Bristol in 1847, died at Monte Carlo, May 15, 1885. At the age of 13 he entered a school frigate for the purpose of training for a seafaring life, but yielding to his father's wishes he abandoned this to become an auctioneer, and employed his leisure time in writing verses and occasional tales for the newspapers. Some of his songs were published in 1878, a volume of verse in 1879; but it was the issue and rapid sale of *Called Back* (1884) which made him famous, Fergus went to London, where he devoted himself to authorship, producing in rapid succession *Dark Days*, *A Family Affair*, and other works.

CONWAY, MONCURE DANIEL, an American author, born in Stafford county, Va., March 17, 1832. He studied law, but abandoned it to enter the Methodist ministry in 1850. Shortly after he left the Methodist ministry and entered the Divinity School at Cambridge, Mass., receiving his diploma in 1854. The same year he became pastor of the Unitarian church in Washington, D. C., and in 1857 took charge of a church in Cincinnati, Ohio. He wrote numerous pamphlets as a representative of the anti-slavery party, and has published various works on theological and other subjects.

CONWAY, THOMAS, COUNT DE (1733-1800), a soldier in the United States army. He distinguished himself in the French army, and in 1777 came to the United States and offered his services to Congress. He was at the battles of Brandywine and Germantown as a brigadier-general. He was made



major-general, Dec. 14, 1777, but in March of the following year resigned. Subsequently he returned to France, and was appointed governor of Pondicherry, and the French settlements in Hindoostan. In 1792 he took charge of the royalist army in the south of France. Count Conway is chiefly known in American history as the leader of a conspiracy to deprive Washington of the command of the army.

CONY, a rabbit, especially the European rabbit (*Lepus cuniculus*). See Britannica, Vol. XX, p. 192. The cony of the Old Testament is supposed to be the Syrian hyrax, or daman (*Hyrax Syriacus*). See Britannica, Vol. XII, p. 599.

CONYBEARE, WILLIAM JOHN, REV., son of William Daniel Conybeare, the eminent geologist, born Aug. 1, 1815, died at Weybridge in 1857. He was educated at Westminster and Trinity College, Cambridge. In 1842 he was appointed principal of the Liverpool Collegiate Institution, which position he was subsequently compelled by ill health to exchange for the vicarage of Axminster. He was joint author with Dean Howson of a widely known *Life and Epistles of St. Paul* (1851). His other works were *Essays, Ecclesiastical and Social* (1856), and a novel.

CONYZA, a genus of plants of the natural order Compositæ, sub-order *Corymbifera*. *Inula conyza*, better known as fleabane, has a strong, peculiar odor, which is said to drive away fleas and gnats.

COOK, DUTTON, dramatic critic and author, born in London, Jan. 30, 1829, died Sept. 11, 1883. He wrote for various newspapers and magazines, including "Temple Bar" and "Chambers's Journal." His eight novels and other productions were well written and interesting.

COOK, ELIZA, a favorite minor English poetess, daughter of a London tradesman, born at Southwark in 1817. She contributed poetical pieces to various magazines from an early age, and issued her *Melania and Other Poems* in 1838. She has also written *Jottings from My Journal* (1860), and *Laconics* (1865).

COOK, JOSEPH, an American author, born in 1838. He was licensed to preach in 1868, and was pastor in Andover, Mass., and Lynn, the following three years. In 1871 he studied in Europe, Asia and Africa. In 1873 he returned to the United States, and lectured on the relations of religion, science and current reform. In 1880 he made a lecturing tour around the world, and was everywhere favorably received. His published works are chiefly on religious subjects.

COOK, MOUNT, the highest peak of Australasia, one of the Southern Alps, near the center of the range, on the western side of the South Island of New Zealand. See Britannica, Vol. XVII, p. 466.

COOKE, GEORGE FREDERICK, actor, born in Westminster in 1756, died in New York city, Sept. 26, 1812. He made his first public appearance at Brentford in 1776, and in the period between 1784 and 1800 became very popular in the English provinces and in Ireland. From 1801 to 1810 he played at Covent Garden both in comedy and in tragedy. In 1810 he visited America, and appeared before enthusiastic audiences in the chief northern cities.

COOKE, HENRY (1788-1868), an Irish Presbyterian minister. In 1808 he was ordained pastor of the church of Duncane, and in 1810 of the one at Donegare. In 1818 he became pastor of the church at Killyleagh, and in 1829 of the largest church in Belfast. He held this last position until his death in 1868.

COOKE, JAY, an American banker, born in 1821. He entered the banking-house of E. W. Clark & Co. as a clerk in 1838, and four years later became

a partner. In 1861 he established a new firm, of which he was the head, and this house became the Government agent for the placing of war loans. At the conclusion of the war the firm became the agent for the Northern Pacific railroad, and the suspension of the banking-house, growing out of its connection with that enterprise, was one of the causes of the financial panic of 1873. Mr. Cooke afterward resumed business with success.

COOKE, JOHN ESTEN (1830-86), an American author. He devoted himself to literature, after practicing law for about four years, until the beginning of the civil war, when he entered the Confederate army. He served in nearly all the battles of Virginia, and at Lee's surrender was inspector-general of the horse artillery of the Army of Northern Virginia. His writings relate almost entirely to Virginia, and describe the life, manners and history of the people of that State.

COOKERY. See Britannica, Vol. VI, pp. 331-33.

COOLEY, THOMAS MCINTYRE, an American jurist, born at Attica, N. Y., Jan. 6, 1824. He was admitted to the bar at Adrian, Mich., in 1846. For the two years following he practiced at Tecumseh, after which he settled in Adrian. He was for a time editor of "The Watch Tower." In 1858 he was appointed reporter of the Supreme Court, and held this office for seven years. In 1859 he became professor of law in the University of Michigan. In 1864 he was elected justice of the Supreme Court of Michigan to fill a vacancy, and was reelected in 1869 for eight years. In 1868-69 he was chief justice, and in 1885 retired from the bench. In 1881 he assumed the professorship of constitutional and administrative law in the University of Michigan. He has published numerous works on law.

COOLIDGE, FREDERICK S., of Ashburnham, Mass., a manufacturer, born in Westminster, Mass., Dec. 7, 1841. He received a common-school education; in politics is a Democrat, and was for several years one of the selectmen of Westminster, besides holding other town offices. In 1874 he was elected a member of the State legislature, being the first Democrat elected from that district since the year of his birth; was a member of the Democratic State committee and a candidate for Presidential Elector on the Democratic ticket in 1888; in 1890 was elected a representative from the 11th Congressional District of Massachusetts to the 52d Congress.

COOPER, PETER, an American philanthropist, born in New York city, Feb. 12, 1791, died there April 4, 1838. He was engaged in various business pursuits till 1823, when he erected the Canton iron-works in Baltimore, and in 1830 built from his own designs the first locomotive engine ever constructed in the United States. He next returned to New York and built an iron-factory, and later, in 1845, erected three blast-furnaces in Phillipsburg, Pa. Mr. Cooper took an active part in the laying of the Atlantic cable, and he was the first and only president of the New York, Newfoundland and London Telegraph Company. But he is most widely known as the founder of Cooper Union, New York city, the corner-stone of which was laid in 1864. This building was erected for the advancement of science and art, and the education of the poorer classes. In 1876 Mr. Cooper was the candidate of the National Independent party for president, and in the election that followed received nearly 100,000 votes.

COOPER, SUSAN FENIMORE, an American authoress, born in 1813. For several years before the death of her father, James Fenimore Cooper, she was his secretary and amanuensis. In 1873 she founded an orphanage in Cooperstown, N. Y., and

in 1886 established "The Friendly Society." Her published works are: *Rural Hours*; *The Journal of a Naturalist*; *Rhyme and Reason of Country Life*; and *Mt. Vernon to the Children of America*.

COOPER, THOMAS (1759-1840), an Anglo-American scientist. He studied law in England and then went to France, where he took a course in chemistry. In 1795 he came to the United States, and practiced law in Northumberland, Pa. In 1811-14 he was professor of chemistry in Dickinson College, and in 1816-21 held a similar position in the University of Pennsylvania. From 1820 to 1834 he was president of the College of South Carolina. Mr. Cooper published many works on political and scientific subjects.

COÖPERATION. See Britannica, Vol. VI, pp. 338-41.

COOPERSTOWN, a pleasant village of New York, named for the novelist, James Fenimore Cooper. It lies at the south end of Otsego Lake, and has a hospital, academy, and orphan asylum.

COOSY, one of the largest rivers of India. After a course of 325 miles through the state of Nepaul and the district of Purneah, it joins the Ganges from the left.

COOT. See Britannica, Vol. VI, pp. 341-42.

COOTEHILL, a town in the northeast of Cavan county, Ireland, on the Cootehill River. It has a trade in linen. Population, 2,000.

COPALCHI BARK, a bark resembling *cascarilla* in its properties, and produced by shrubs of the same genus. It is used as a substitute for cinchona.

COPE, CHARLES WEST, an English painter, born in 1811, died Aug. 20, 1890. His paintings are chiefly of a historical nature, but he also executed some valuable domestic pieces. He frescoed the Peers' corridor in the Houses of Parliament. He became a Royal academician in 1848, and professor of painting to the Academy in 1867.

COPE, EDWARD DRINKER, an American naturalist, born in 1840. He studied comparative anatomy in the United States and in Europe, and from 1864 to 1867 was professor of natural sciences in Haverford College. He was for some time palæontologist to the United States geological survey, and later curator of the Academy of Natural Sciences of Philadelphia. Prof. Cope is a member of numerous scientific societies in America and Europe, and in 1884 was vice-president of the section on biology of the American Association for the Advancement of Science. He has published many important works on scientific subjects.

COPECK, the oldest Russian coin, and the first substitute for furs as a medium of exchange.

COPLAND, JAMES, a physician, born at Deerness, in the Orkneys, in 1791, died July 12, 1870. He graduated M. D. at Edinburgh in 1815, and settled to practice in London in 1820. He published the *Dictionary of Practical Medicine* (3 vols., 1832), a monument of enormous industry; also works on palsy and apoplexy (1850), and on consumption (1861).

COPOÉE, FRANÇOIS EDOUARD JOACHIM, a French poet, born in 1842. He produced poetical pieces of merit at a very early age, and while still young commenced writing dramas. He was a favorite of Napoleon III, who gave him a position in the library of the senate at the Luxembourg, and in 1878 he became archiviste of the Comédie Française.

COPEE, HENRY, an American educator, born in 1821. He served as an officer of artillery through the Mexican war, and received the brevet of captain for gallantry. From 1850 to 1855 he was assistant professor of geography, history and ethics at West Point, and from 1855 to 1866 was professor of

English literature in the University of Pennsylvania. From 1866 to 1875 he was president of Lehigh University, and then exchanged the presidency for the professorship of history. He has published many works on scientific and other subjects.

COPPER. See Britannica, Vol. VI, pp. 347-52.

COPPERHEAD (*Trigonocephalus contortrix*), a venomous serpent, closely allied to the rattlesnake, found in eastern North America from New England to Florida. It has a thick body from 2 to 3 feet long, a short tail without rattles, and is slow and clumsy in its movements; but lurking in dark and moist places, and giving no warning of its proximity, it is more dreaded than the rattlesnake. The term was applied during the civil war by the Unionists of the North to Southern sympathizers, as suggesting insidious foes.

COPPERED, COPPERING, in ship-building, the terms used in reference to the sheathing applied to the bottom.

COPPER INDIGO, an ore of copper found in spheroidal masses, of an indigo-blue color, in Thuringia and Vesuvius. It is very nearly pure sulphuret of copper.

COPPERMINE RIVER, a river in Canada, which enters a bay of the Arctic Ocean, northeast of the Great Bear Lake, after a course of about 250 miles.

COPPER MINING IN THE UNITED STATES. The copper production in the United States was confined chiefly in 1890 to five states and territories. The list with the output of the mines during the year 1889 is made up as follows: Montana, 98,222,444 pounds; Michigan, 87,455,672 pounds; Arizona, 31,586,185 pounds; New Mexico, 3,686,137 pounds; Colorado, 1,170,053 pounds.

The census report shows the United States to be the largest producer of copper in the world, its product for the year 1889 being 226,055,962 pounds, or 113,028 short tons. The total expenditures involved in this production were \$12,062,180, of which there was paid in wages, \$6,096,025; in salaries, \$120,896; to contractors, \$334,443; for materials and supplies, \$4,067,970, and for taxes, rent, etc., \$1,442,864. Total capital invested, \$62,623,228; total employes, exclusive of office force, 8,721.

COPYRIGHT BILL, INTERNATIONAL, of the United States. For earlier copyright laws in various countries, see Britannica, Vol. VI, pp. 356-67. The following is the full text of the International Copyright bill as approved and signed March 3, 1891:

Be it enacted, That section 4952 of the Revised Statutes be and the same is hereby amended so as to read as follows: "SECTION 4952—The author, inventor, designer or proprietor of any book, map, chart, dramatic or musical composition, engraving, cut, print or photographic negative thereof, or of a painting, drawing, chromo, statue, statuary, and of model or designs intended to be perfected as works of art, and the executors, administrators or assigns of any such person shall, upon complying with the provisions of this chapter have the sole liberty of printing, reprinting, publishing, completing, copying, executing, finishing and varying the same, and in the case of dramatic composition of publicly performing or representing it, or causing it to be performed or represented by others, and authors or their assigns shall have the exclusive right to dramatize and translate any of their works for which copyright shall have been obtained under the laws of the United States."

SEC. 2. That Section 4954 of the Revised Statutes be and the same is hereby amended so as to read as follows: "Section 4954—The author, inventor or designer, if he be still living, or his widow or children if he be dead shall have the same exclusive right continued for the further term of fourteen years, upon recording the title of the work or description of the article so secured a second time and complying with all other regulations in regard to original copyright within six months before the expiration of the first term, and such persons shall within two months from the date of said renewal cause a copy of the record thereof to be published in one or more newspapers printed in the United States for the space of four weeks."

SEC. 3. That Section 4956 of the Revised Statutes of the United States be and the same is hereby amended so that it



shall read as follows: "Section 4956—No person shall be entitled to a copyright unless he shall, on or before the day of publication in this or any foreign country, deliver at the office of the Librarian of Congress, or deposit in the mail within the United States, addressed to the Librarian of Congress at Washington, District of Columbia, a printed copy of the title of the book, map, chart, dramatic or musical composition, engraving, cut, print, photograph, or chromo, or a description of the painting, drawing, statue, statuette, or a model or design for a work of the fine arts, for which he desires a copyright, nor unless he shall, also, not later than the day of the publication thereof in this or any foreign country, deliver at the office of the Librarian of Congress, at Washington, District of Columbia, or deposit in the mail within the United States, addressed to the Librarian of Congress, at Washington, District of Columbia, two copies of such copyright book, map, chart, dramatic or musical composition, engraving, chromo, cut, print, or photograph, or in case of a painting, drawing, statue, statuette, model, or design for a work of the fine arts, a photograph of same: *Provided*, That in the case of a book, photograph, chromo, or lithograph, the two copies of the same required to be delivered or deposited as above shall be printed from type set within the limits of the United States, or from plates made therefrom, or from negatives, or drawings on stone made within the limits of the United States, or from transfers made therefrom. During the existence of such copyright the importation into the United States of any book, chromo, or lithograph, or photograph, so copyrighted, or any edition or editions thereof, or any plates of the same not made from type set, negatives or drawings on stone made within the limits of the United States, shall be, and it is hereby, prohibited, except in the cases specified in paragraphs five hundred and twelve to five hundred and sixteen, inclusive, in section two of the act entitled "An act to reduce the revenue and equalize the duties on imports, and for other purposes," approved October first, eighteen hundred and ninety; and except in the case of persons purchasing for use and not for sale, who import subject to the duty thereon, not more than two copies of such book at any one time; and except in the case of newspapers and magazines, not containing in whole or in part any illustrations, under the provisions of this act, unauthorized by the author, which are hereby exempted from prohibition of importation: *Provided*, nevertheless, That in the case of books in foreign languages, of which only translations in English are copyrighted the prohibition of importation shall apply only to the translation of the same, and the importation of the books in the original language shall be permitted."

Sec. 4. That section forty-nine hundred and fifty-eight of the Revised Statutes be, and the same is hereby, amended so that it w<sup>l</sup> read as follows:

"Sec. 4958. The Librarian of Congress shall receive from the persons from whom the services designated are rendered the following fees:

"First. For recording the title or description of any copyright book or other article, fifty cents.

"Second. For every copy under seal of such record actually given to the person claiming the copyright, or his assigns, fifty cents.

"Third. For recording and certifying any instrument of writing for the assignment of a copyright, one dollar.

"Fourth. For every copy of an assignment, one dollar.

"All fees so received shall be paid into the Treasury of the United States: *Provided*, That the charge for recording the title or description of any article entered for copyright, the production of a person not a citizen or resident of the United States, shall be one dollar, to be paid as above into the Treasury of the United States, to defray the expenses of lists of copyrighted articles as hereinafter provided for.

"And it is hereby made the duty of the Librarian of Congress to furnish to the Secretary of the Treasury copies of the entries of titles of all books and other articles wherein the copyright has been completed by the deposit of two copies of such book printed from type set within the limits of the United States, in accordance with the provisions of this act and by the deposit of two copies of such other article made or produced in the United States; and the Secretary of the Treasury is hereby directed to prepare and print, at intervals of not more than a year, catalogues of such titles, entries for distribution to the collectors of customs of the United States and to the postmasters of all postoffices receiving foreign mails, and such weekly lists, as they are issued, shall be furnished to all parties desiring them, at a sum not exceeding five dollars per annum; and the Secretary and the Postmaster-General are hereby authorized and required to make and enforce such rules and regulations as shall prevent the importation into the United States, except upon the conditions above specified, of all articles prohibited by this act."

Sec. 5. That section forty-nine hundred and fifty-nine of the Revised Statutes be, and the same is hereby, amended so as to read as follows:

"Sec. 4959. The proprietor of every copyrighted book or other article shall deliver at the office of the Librarian of Congress, or deposit in the mail, addressed to the Librarian of Congress, at Washington, District of Columbia, a copy of every subsequent edition wherein any substantial changes shall be made: *Provided*, however, That the alterations, revisions, and additions made to books by foreign authors, heretofore published, of which new editions shall appear subsequently to the taking effect of this act, shall be held and deemed

capable of being copyrighted as above provided for in this act, unless they form a part of a series in, course of publication at the time this act shall take effect."

Sec. 6. That section forty-nine hundred and sixty-three of the Revised Statutes be, and the same is hereby, amended so as to read as follows:

"Sec. 4963. Every person who shall insert or impress such notice, or words of the same purport, in or upon any book, map, chart, dramatic, or musical composition, print, cut, engraving, or photograph, or other article for which he has not obtained a copyright, shall be liable to a penalty of one hundred dollars, recoverable one-half for the person who shall sue for such penalty and one-half to the use of the United States."

Sec. 7. That section forty-nine hundred and sixty-four of the Revised Statutes be, and the same is hereby, amended so as to read as follows:

"Sec. 4964. Every person, who after the recording of the title of any book and the depositing of two copies of such book, as provided by this act, shall, contrary to the provisions of this act, within the term limited, and without the consent of the proprietor of the copyright first obtained in writing, signed in presence of two or more witnesses, print, publish, dramatize, translate, or import, or knowing the same to be so printed, published, dramatized, translated, or imported, shall sell or expose to sale any copy of such book, shall forfeit every copy thereof to such proprietor, and shall also forfeit and pay such damages as may be recovered in a civil action by such proprietor in any court of competent jurisdiction."

Sec. 8. That section forty-nine hundred and sixty-five of the Revised Statutes be, and the same is hereby, so amended as to read as follows:

"Sec. 4965. If any person after the recording of the title of any map, chart, dramatic or musical composition, print, cut, engraving, or photograph, or chromo, or of the description of any painting, drawing, statue, statuette, or model or design intended to be perfected and executed as a work of the fine arts, as provided by this act, shall within the term limited, contrary to the provisions of this act, and without the consent of the proprietor of the copyright first obtained in writing, signed in presence of two or more witnesses, engrave, sketch, work, copy, print, publish, dramatize, translate or import, either in whole or in part, or by varying the main design with intent to evade the law, or knowing the same to be so printed, published, dramatized, translated or imported, shall sell or expose to sale any copy of such map or other article as aforesaid, he shall forfeit to the proprietor all the plates on which the same shall be copied, and every sheet of the plates, and shall further forfeit \$1 for every sheet of the same found in his possession, either printing, printed, copied, published, imported or exposed for sale; and in case of a painting, statue, or statuette, he shall forfeit \$10 for every copy of the same in his possession or by him sold or exposed for sale; one-half thereof to the proprietor and the other half to the United States."

Sec. 9. That Section forty-nine hundred and sixty-seven of the Revised Statutes be, and the same is hereby amended, so as to read as follows:

"Sec. 4967. Every person who shall print or publish any manuscript whatever without the consent of the author or proprietor first obtained shall be liable to the author or proprietor for all damages occasioned by such injury."

Sec. 10. That Section 4971 of the Revised Statutes be and the same is hereby repealed.

Sec. 11. That for the purpose of this act each volume of a book in two or more volumes, when such volumes are published separately, and the first one shall not have been issued before this act take effect, and each number of a periodical shall be considered an independent publication subject to the form of copyrighting as above.

Sec. 12. That this act shall go into effect on the 1st day of July, A. D. 1891.

Sec. 13. That this act shall only apply to the copyright or subject of a foreign State or nation when such foreign State or nation permits to citizens of the United States of America the benefit of copyright on substantially the same basis as it its own citizens, or when such foreign state or nation is a party to an international agreement which provides for reciprocity in the granting of copyright, by the terms of which agreement the United States of America may at its pleasure become a party to such an agreement. The existence of either of the conditions aforesaid shall be determined by the President of the United States by proclamation made from time to time as the purpose of this act may require.

The original copyright covers a period of 28 years, and this period may be extended for a period of 14 years longer by complying with all regulations with regard to the original copyright, and by recording the title of the book, or map, chart, engraving, photograph or painting within six months before the expiration of the first period, and by causing a copy of the record thereof to be published in one or more newspapers in the United States for the space of four weeks.

On July 1, 1891, President Harrison announced by proclamation that the governments of Switzer-

land, France, Belgium and Great Britain having informed him of the existence within their territory of the necessary conditions, the benefits of the law were therefore and thereby extended to the citizens or subjects of those governments. It ought to be understood, however, that there is no international copyright arrangement between the United States and any other country. For an American citizen to secure copyright in Great Britain the following conditions must be met: 1. The title must be entered at Stationers' Hall, London, the fee for which is 5 shillings sterling. 2. The work must be first published in Great Britain before being issued elsewhere. 3. The author must be on British soil at the date of publication (the latter requirement, however, is of doubtful obligation under recent judicial decisions.)

Copyright may be secured in France, by a foreigner, by depositing two copies of the publication at the ministry of the interior at Paris.

To secure copyright in Germany, a foreigner must enter his work in the general registry book of copyrights at Leipzig, and have it published by a firm having its place of business within the German Empire.

Copyright in Canada is to be registered with the minister of agriculture, fee one dollar, and the work to be published in Canada.

COQUIMBO, or SERENA. See *Britannica*, Vol. XXI, pp. 674-75.

CORALLINE, a genus of marine algae, remarkable for rigidity, which is mostly owing to a calcareous incrustation. It is an object of great beauty in the rock-pools. There are about thirty known species, chiefly tropical.

CORBAN, in Judaism, any offering to God in fulfillment of a vow. To the law concerning vows, the rabbins added the rule that a man might interdict himself by a vow, not only from enjoying anything himself, but also from giving it to others. The thing interdicted was considered as corban. Many of the Jews took advantage of this rule to shirk inconvenient obligations. It was this selfishness under the garb of religion which Christ rebuked in the Scribes and Pharisees.

CORBET, RICHARD (1582-1635), an English poet and bishop. He was educated at Westminster School, Broadgates Hall (now Pembroke College), and Christ Church, Oxford. He took orders, and had already enjoyed preferments at Cassington and Stewkeley, as well as a prebend in Salisbury, when in 1620 he was made dean of Christ Church. In 1624 he was appointed to the see of Oxford, and translated to that of Norwich in 1632. Here he died in 1635. Corbet's poetry reflects the genial temper and wit for which he was famous. His longest work is *Iter Boreale*, an account of the holiday tour of four students; the best as well as the best-known is the *Fairies' Farewell*.

CORBIE-STEPS, CORBEL-STEPS, or CROW-STEPS, a succession of steps with which gables of houses are sometimes ornamented.

CORCELLES, CLAUDE FRANÇOIS PHILIBERT TIRCUIT DE, a French diplomatist, born in 1802. He was elected to the Chamber of Deputies in 1837, and again in 1848. In 1851 he retired from politics, and remained in private life until 1871, when he returned to the legislature. From 1873 to 1876 he was ambassador to Rome.

CORDAGE, the running rigging of a ship, as distinguished from the standing rigging. The name is also given to the store of rope kept in reserve.

CORD-GRASS, a common name of the grasses of the genus *Spartina*. Some of the species, on account of the toughness of their fiber, are used for making ropes.

CORDIACEÆ, drupaceous *Boraginaceæ*. Some species are valued for their fruit, and others for their timber.

CORDON: in military operations, a line of sentinels, inclosing or guarding any particular space of ground, to prevent the passage of persons other than those belonging to the army.

COREA (CH'AO-HSIEN, or KAOLE). See *Britannica*, Vol. VI, pp. 390-94. The most recent official statistics give the population of Corea as 10,528,937. The capital is Seoul, with a population of about 250,000. Very little is known of the interior, either as to the people or the nature of the soil; but rice, millet, cotton, hemp, tobacco, and many fruits are grown on the fertile territory skirting the sea, and the people are similar in their habits to the Chinese on the neighboring mainland. In 1876 Corea concluded a treaty with Japan; in 1882 with China and the United States; in 1884 with Italy and Russia; and in 1886 with France. An overland trade convention has also been concluded with Russia. In these treaties Corea was treated with as an independent state, and by virtue of them the three ports of Jenchuan, Fusan and Yuen-san are now open to foreign commerce. The total value of the trade at the three ports was, in 1889—imports, \$3,377,815; exports, \$1,233,841. The value of the trade for 1890 was about double these figures. A military school, under the charge of two ex-army officers of the United States, has recently been established by the government. The army consists of about 7,000 troops.

CORDOVAN, leather prepared from goat skins. It was originally manufactured by the Moors of Cordova—hence its name. The best cordovan still comes from the Levant.

COREGONUS, a genus of fishes. See GWYNIAID, *Britannica*, Vol. XI, p. 346; POLLAN, Vol. XIX, p. 402; POWAN, Vol. XIX, p. 650; COREGONUS, XXI, pp. 221, 223; VENDACE, Vol. XXIV, p. 137; WHITEFISH, Vol. XXIV, p. 552.

CORENTYN, a river of South America. It rises 25 miles east of the Essequibo, flows north separating the British and Dutch Guiana, and enters the Atlantic. It is navigable for a distance of 150 miles.

CORINNE CITY, an important town of Utah, situated on Bear River, about twenty-five miles north of Ogden. It is extensively engaged in shipping, and has a large trade in general produce and merchandise.

CORINTH, the county-seat of Alcorn county, Miss., and a great railroad junction of important lines of travel. It was the scene of an important battle, Oct. 3, 1862, between the National forces and the Confederates.

CORK. See *Britannica*, Vol. VI, p. 402.

CORLISS, GEORGE HENRY (1817-88), an American inventor. His most important inventions were the improvements in steam engines, by which uniformity of motion was secured by the method of connecting the governor with the cut-off. Mr. Corliss was a member of the Rhode Island legislature from 1868 to 1870, and was a Republican Presidential Elector in 1876. He received numerous high honors for mechanical achievements.

CORM, the short, bulb-like subterranean stem of many endogenous plants. It annually produces buds in the form of small corms, either from its summit or its side, and these gradually exhaust and destroy it. When a corm produces young corms from its summit, as in the crocus, they approach in a few years the surface of the soil, however deeply they may at first have been planted.

CORMORANT. See *Britannica*, Vol. VI, pp. 407-08.



CORN, as usually applied, a generic name for all seeds used in making bread, especially the seeds of cerealia. In England, corn means wheat; in Scotland, oats; and in the United States, maize.

CORNACEÆ, a small natural order of exogenous plants, containing about 40 known species, chiefly trees and shrubs, of the northern temperate regions. The fruits of some are edible.

CORN APHIS (*Aphis granaria*), a plant louse, which is often injurious to corn crops, appearing in great numbers on the ears, sucking the juice of the plant and so impoverishing the grain. The male is green; the female, dull orange.

CORN BEETLE (*Cucujus testaceus*), a minute beetle, whose larvæ feed on grain, particularly wheat. The perfect insect is of a tawny color; the larvæ, ochreous, with a forked tail.

CORNBRAH, a member of the Lower Oolite. It consists chiefly of rubbly cream-colored limestone in thin layers, always nodular and concretionary, each fragment having a deep red coating.

CORN-CKOCKLE, or CORN-ROSE (*Agrostemma Githago*), a tall weed, a native of Europe or the west of Asia, but now found in many countries. It is a frequent weed among crops of grain, and is well known on account of its large purple flowers.

CORN CROP. For corn or maize crop, see *Britannica*, Vol. XV, pp. 509-10. The corn crop of the United States in 1889 reached the large total of 2,112,292,000 bushels. This is the largest corn crop reported in the entire history of the country. The largest total previously reached was that of 1888, when the amount reported was 1,987,790,000 bushels. Among the incidents of special historic value to farmers connected with the corn crop of 1889 were the results of a "prize contest," suggested and vigorously promoted by the publishers of the "American Agriculturist." The prize offered was for the largest yield of chemically dry shelled corn on a single acre during the year 1889. It was awarded to Mr. Z. J. Drake, of Marlborough county, South Carolina, whose single acre produced the enormous and hitherto unparalleled yield shown by the following figures: Total corn on ear, 17,407 lbs. (82 per cent. corn and 18 per cent. cob); shelled corn or kernels, 14,273 lbs.; shelled corn, green, 255 bushels; shelled corn, crib-cured, 239 bushels; shelled corn, chemically dry, 217 bushels—the greatest yield for a single acre ever recorded.\*

\*The acre selected by Mr. Drake was a sandy soil. The original growth was oak, hickory, and long-leaf pine. Three years previous, before the land was improved, \$8 per acre was a fair valuation, while thirty years ago the plantation of which this acre is an average specimen was called by its owner "Starvation's Empire." It had a gentle slope, with northern exposure and was naturally well drained. The acre was a fair specimen of much of the poor land in the South, and its improvement and productiveness affords an instructive lesson.

This acre was given every possible help suggested to the mind of the owner. In February, 1889, he hauled upon it 1,000 bushels of manure, the droppings of horses and mules fed on corn and other fodder. At the same time 500 lbs. each of manipulated guano, cotton-seed meal and kainit were broadcasted, and the whole plowed under. Following the plow whole cotton-seed was strewn in the furrows, at the rate of 600 bushels to the acre. A subsoil plow came after, breaking the soil to the depth of 13 inches, and burying the cotton-seed deeper than other manure. In this way he thought the decaying seed would back up the crop in the later season when the corn roots had penetrated beyond the other manures. One horse and a man did the plowing and subsoiling in a day, March 6, at a total cost of \$2. The surface was harrowed the same day. The next day the acre was laid off in rows, two furrows to each, followed by the subsoil plow in each row. The rows were alternately three and six feet apart; i. e., there were three feet between two rows, then six feet between two rows, then three feet, and so on. The seed planted was the common gourd variety of the southern white dent corn, and five or six kernels were dropped to each foot of row. The latter were five inches deep, but the seed was only covered lightly, an inch deep, by raking in the sides

CORNEL or CORNELIAN CHERRY, the *Cornus* of the ancients, a tree or shrub of the natural order *Cornaceæ*, a native of Asia and the south of Europe. The fruit is oblong, shining red, and when perfectly mellow has an agreeable, vinous acid taste. It is much used in Turkey in making sherbet. The wood is extremely hard and tough, and is used for making mathematical instruments.

CORNELL, EZRA, an American philanthropist, born at Westchester Landing, N. Y., Jan. 11, 1807, died at Ithaca, Dec. 11, 1874. He settled in Ithaca in 1823, and conceived and developed the water-power tunnel at Fall Creek. He superintended the establishment of the first telegraph line in America, opened between Baltimore and Washington in 1844. Thereafter he devoted himself to the erection of el-graph lines through the United States, and was the founder of the Western Union Telegraph Company. Mr. Cornell founded the University at Ithaca, N. Y., which bears his name.

CORNELL COLLEGE. See COLLEGES, in these Revisions and Additions.

CORNELL UNIVERSITY. See COLLEGES, in these Revisions and Additions.

CORNET, formerly the lowest grade of commissioned officer in the British cavalry. With the lieutenant he assisted the captain in the daily duties connected with the troop to which he belonged. Cornets were abolished in 1871, sub-lieutenants being substituted.

CORN-FLOWER, a name especially applied to *Centaurea Cyanus*, a well-known composite weed of cornfields, much admired for the beauty of its deep blue flowers. From early times it has been used for decoration in wreaths and garlands. This use became specially prominent in Germany after 1870, on account of its being the Emperor William's favorite flower.

CORN-FLY, a common name of a number of small dipterous insects of the large family *Muscides*, which do much injury to corn crops. Its larvæ live on the juice of the plant, which causes the swelling of the joint, and the plant either produces no ear or an imperfect one.

CORN-GROUND BEETLE, an insect of the order *Coleoptera*, section *Pentamera*. It burrows in the ground, climbs the stalks at night and devours the ears; the larva burrows in the earth, and eats the stems of corn close to the surface of the ground.

CORNIFEROUS, in geology, a term applied to a group of rocks belonging to the lower division of the Devonian series. The formation extends

of the furrow. On April 8 the crop was hoed for the first time, and thinned to one stalk every five or six inches in the rows, and the missing places replanted. On April 20 the wide spaces between the six feet alternate rows were plowed with the subsoil plow. Then a compost consisting of 300 lbs. each of manipulated guano, cotton-seed meal, acid phosphate, and bone was sown in the open furrows, thus confining this plant food to the wide spaces, after which the whole acre was gone over with a harrow. On May 15 the narrow three feet spaces were plowed with the subsoiler, and 300 lbs. of nitrate of soda was sown in the freshly opened furrows, and worked with a hand cultivator. On May 25 the harrow was run through the wide rows to loosen the crust. Later, the wide spaces were further stimulated by running through the middle of them three close subsoil furrows with the application in the furrows of 200 lbs. of manipulated guano. On June 2 the land was stirred with the hoe and a little earth was hoed into the corn, but only so as to make the surface about even around the stocks. On June 4, 5 and 8, these furrows were again turned in the middle of the wide rows, and 500 lbs. of a mixture composed of equal parts of guano, cotton-seed meal, and kainit applied in the wide space furrows, and the whole of the field hoed. On June 11, 100 lbs. of nitrate of soda were sown and harrowed in the narrow rows. No hilling of the corn was done, but so wonderful was the growth that it soon became necessary to put up posts and nail slats on both sides of the rows to prevent falling. In due time the harvest came with its remarkable figures and its invaluable lessons.

through New York and Canada, and farther west and southwest. The name corniferous (Lat. *cornu*, "horn," *fero*, "I bear") has reference to the common occurrence in the limestone of a quartzose mineral called hornstone.

CORNING, an important town of New York, pleasantly situated on the Chemung River, about 17 miles west of Elmira. It has excellent educational facilities, and contains a variety of manufactories, including flint-glass and railroad cars.

CORN-MOTH (*Tinea granella*), a small species of moth, very destructive to grain sheaves in the field and stored grain, among which it lays its eggs. The larva, which for its voraciousness, is known as the wolf, eats into the grain, and joins it together by a web. Frequent turning is resorted to for the destruction of the eggs and larva, and salt is for the same purpose mixed with grain.

CORNO MONTÉ, or GRAN SASSO D'ITALIA, a mountain in Southern Italy, the culminating peak of the Apennines. It has an elevation of 9,593 feet above the level of the sea.

CORNS, small hard growths, occurring principally on the feet, resulting from an increase in the thickness of the cuticle or epidermis, and generally caused by the irritation of some excessive pressure or friction on the part, as by tight or ill-fitting shoes. Corns are either hard or soft, the structure of both classes being essentially the same. A hard corn begins as an ill-defined thickening of the epidermis at one point. As irritation continues the excessive growth of epidermis increases, and the papillæ beneath also enlarge, giving the deeper part of the growth a fibrous appearance, popularly described as the roots of the corn. Pressure upon the sensitive nerves of these papillæ causes the usual pain of corns. Soft corns occur between the toes, where the warmth and moisture promote early separation of the epidermis and growth of the papillæ; they are therefore more vascular than the other forms, and often extremely painful.

Corns affect horses as well as men. In the foot of the horse they occur in the angle between the bars and outer crust, and consist in a bruise of the sensitive secreting sole. Corns cause a short, careful, tripping gait; are the most frequent source of lameness in roadsters; abound in badly-shod horses, and usually occur in the inside heels of the fore-feet. See Britannica, Vol. XXII, p. 121.

CORN SALAD, or LAMB'S LETTUCE. See Britannica, Vol. XII, p. 281.

CORN SAWFLY (*Cephus pygmaeus*), an insect that injures corn in Europe. The larva bores into the stalk of the cereal, and prevents the filling of the ears. The genus *Cephus* is found in the United States, but none of its species exhibit that habit.

CORNSTONE, an arenaceous or siliceous limestone, often mottled, and not infrequently concretionary. It usually occurs in those systems which are largely composed of reddish sandstones.

CORN-THRIPS, an insect. See Britannica, Vol. XXIV, p. 534.

CORNUCOPIA, the horn of plenty, regarding whose origin several fables are told by the ancient poets. It is frequently used in architecture. On the arms of banks and other public buildings, it is often represented pouring forth coins.

CORNWALL, a port of entry of Ontario, at the mouth of the Cornwall canal, and separated by the St. Lawrence from New York State. It is on the Grand Trunk railway, 67 miles southwest of Montreal. Population, 2,033.

CORNWALLIS, CAROLINE FRANCIS, daughter of the rector of Wittersham and Eltham, in Kent, England, born in 1786, died Jan. 8, 1858. She early acquired a thorough knowledge of Latin and Greek,

and made herself conversant with nearly every study which occupies thoughtful men. She was the author of a series of twenty *Small Books on Great Subjects*; and *Pericles: a Tale of Athens* (1847).

CORN WEEVIL, a wheat pest. See Britannica, Vol. XXIV, p. 536.

COROLLARY, a proposition, the truth of which appears so clearly from the proof of another proposition as not to require separate demonstration.

CORONA, or CROWN, in botany, an appendage of the corolla, sometimes assuming very peculiar forms. It occasionally has the appearance of an interior corolla, very different from the true corolla.

CORONA BOREALIS, a small and bright constellation near Hercules.

CORONADO, a celebrated summer and winter resort of California, situated on the Pacific coast, near San Diego, and just north of the Mexican boundary line. It is noted for its medicinal spring, its fine bathing facilities, its exhilarating climate, and its magnificent scenery.

CORONATION GULF, an inlet of the Arctic Ocean, forming the southeast part of the landlocked and isle-studded bay that receives the Copernicus.

CORONELLA, a genus of non-venomous serpents of the family *Colebridae*, of small size, having a somewhat compressed and pentagonal body, and rather long conical tail. They inhabit the warm and temperate parts of the world.

CORONER. See Britannica, Vol. VI, pp. 430-31.

CORPORAL, the grade of non-commissioned officer next below that of sergeant. In the United States army the corporal is the lowest non-commissioned officer. He has charge of a squad, places and relieves sentinels, and in barracks or camp he exercises certain disciplinary control over the privates.

CORPORATION. See Britannica, Vol. VI, pp. 432-35.

CORPS D'ARMÉE: in the military system of the greater continental European states, a part of the army divided into several corps, each complete in itself as an army with everything needful for service. In the French system a military force of 100,000 men is regarded too large for one army; it is therefore divided into 20 corps, and Germany has even a larger number.

CORPUS CHRISTI, a city, county-seat of Nueces county, Texas. It is on Corpus Christi bay, and has a harbor unsurpassed by any on the coast.

CORPUS DELICTI, a criminal law term, used to signify the substance or essential actual fact of the crime or offense charged. Thus, in a case of murder the fact that the accused had feloniously caused the death of the victim must be clearly shown, and this is called the *corpus delicti*. Without proof of this fact, no matter how suspicious the other circumstances, such as the clandestine disposal of the body, the presence of actuating motive, opportunity for the commission of the crime, and innumerable other criminating facts, a conviction of murder would not be justified. So, in case of larceny, proof of the felonious taking supplies the *corpus delicti*.

CORPUS JURIS CIVILIS, the whole body of the Roman or civil law, as comprised in the Institutes, the Digest, the Code, and the Novellæ.

CORREGIDOR, the name given in Spain to the principal magistrate of a town.

CORRESPONDENCE CLASSES, a method of instruction first fully developed in the United States by the Chautauqua Literary and Scientific Circle, and since adopted in England.

CORRIDOR, a gallery or passage leading to several rooms. Spacious corridors are necessary in all public buildings, such as hospitals, prisons, etc.



**CORROBOREE**, **CORROBORY**, the Australian name for a gathering of aborigines, generally in large numbers, at which dances and other exercises are performed with much excitement. They usually take place on moon-light nights, and frequently last the whole night through.

**CORRY**, a city of Pennsylvania. See *Britannica*, Vol. VI, p. 439.

**CORSAC**, a species of fox (*Vulpes corsac*), found in the deserts of Tartary and in India. It resembles the *Vulpes velox*, or swift fox, of North America. It is gregarious, burrows, prowls during the day, and lives chiefly on birds and their eggs.

**CORSAIR**, one who seizes and plunders merchant-vessels, now generally limited in its application to the pirates who in former times were the terror of merchantmen in the Mediterranean.

**CORSICANA**, a flourishing city, railroad center, and county-seat of Navarro county, Texas. It has several seminaries and asylums and manufactories of flour, ice, and brick.

**CORSITE**, a variety of rocks composed essentially of anorthite-feldspar and hornblende. The name was given from the occurrence of rocks of this kind on the island of Corsica.

**CORSNED**, or morsel of execration, was a piece of bread made use of in early times to ascertain whether persons suspected of crime were guilty or innocent. The bread was consecrated with a form of exorcism, and caused to be swallowed by the suspected person as a trial of his innocence. If it produced convulsions and paleness, and could find no passage, the person was guilty, and innocent if it would cause no harm.

**CORSO**, an Italian word used to express racing of horses, and processions of handsome equipages driving through the principal streets of a town, such as almost always takes place in Italy on festivals. This custom has given a name to many streets in the larger towns of Italy.

**CORTLAND**, a railroad junction and the county-seat of Cortland county, N. Y. It has a State normal school and various manufactories.

**CORUNDUM**. See *Britannica*, Vol. XVI, p. 385.

**CORVALLIS**, a thriving town of Oregon, county-seat of Benton county, situated on the west bank of the Willamette River. It is the seat of the State Agricultural College.

**CORVEE**, the name usually given in France to the obligation on the inhabitants of districts to perform gratuitous labor for the sovereign or feudal lord.

**CORVETTE**, a flush-decked vessel, frigate rigged without a quarter-deck, and having only one tier of guns.

**CORVIDÆ**. See *Britannica*, Vol. VI, p. 617, and Vol. XVIII, p. 48.

**CORWEN**, a town in North Wales, situated on the right bank of the Dee, 10 miles west of Llangollen. Population of parish, 2,646.

**CORWIN**, **THOMAS** (1794-1865), an American statesman. He was admitted to the bar in 1818, and four years later became a member of the Ohio legislature, serving seven years. From 1830 to 1840 he was a member of Congress, when he resigned to become governor of Ohio, holding this office two years. In 1844 he became a United States Senator, and served in this capacity till 1850, when he was made Secretary of the Treasury. Mr. Corwin was elected to Congress in 1858 and again in 1860, and later was appointed by President Lincoln as minister to Mexico.

**CORYDON**, a town of Indiana, county-seat of Harrison county, and former capital of the State, situated on Indian Creek, 115 miles south of Indianapolis. It is the seat of an academy, contains

various manufactories, and is noted for its sulphur spring.

**CORYMB**, in botany, a form of indefinite and centripetal inflorescence, in which the flowers are arranged as in a raceme, but the lower flower-stalks are elongated so as to bring the flowers almost to the level of those of the upper.

**CORYMBUS**, the particular mode of dressing the hair among the Greeks, with which the statues of Venus have rendered us familiar. The hair was often covered with a sort of open ornamental work.

**CORYPHENE** (*Coryphæna*), a genus of fishes of the family *Scomberidæ*, remarkable for the beauty and metallic brilliancy of their color. They are natives of the seas of warm climates.

**COSCINOMANCY**, a divination practiced in early times by suspending a sieve from the point of a pair of shears. A mystical form of words and names of persons suspected of theft were then repeated, and if the sieve moved when a name was pronounced the person named was deemed guilty. See *Britannica*, Vol. VII, p. 293.

**COSHERY**, or **COSHERING**, in Ireland, the ancient feudal right of a chief to quarter himself and his retainers on his tenantry at his own discretion. This exaction was afterwards commuted for *quit-rent*.

**COSHOCTON**, county-seat of Coshocton county, Ohio. It has a railroad junction on the Muskingum River, and has a paper mill and iron and steel works.

**COSMETICS**, chemical preparations employed for improving the appearance of the skin and hair.

**COSTA**, **ISAAC DA**, an eminent poet and religious writer, born at Amsterdam in 1798, died in 1860. In his 20th year he acquired the degree of LL.D., and embracing Christianity was baptized. This subjected him to considerable persecution, which, however, subsided as his genius gradually gained recognition. The most interesting of his writings are his translation of Byron's *Cain*, *Harmony of the Gospel*, etc. His *Battle of Nieuwpoort*, the last of his poems, is one of his master-pieces.

**COSTA**, **SIR MICHAEL**, musician and composer, born at Naples in 1810. He was sent to the conservatoire in his native city for education, where he greatly distinguished himself. In 1830 he was appointed conductor of music in the Italian Opera, London—an office, which in 1847, he resigned for a similar one in the Royal Italian Opera, Covent Garden. He was knighted by Queen Victoria in 1869, and in the same year received the Royal Order of Frederick from the king of Wurtemberg.

**COSTA RICA** (Republica de Costa Rica), the most southern Republic of Central America (see *Britannica*, Vol. VI, pp. 449-51). The legislative power is vested in a Chamber of Representatives—one representative to every 10,000 inhabitants—chosen in electoral assemblies, the members of which are returned by the suffrage of all who are able to live "respectably." In 1889 there were 537 electors and 28 deputies. The last official census was taken in 1883, and gave the area as 23,000 square miles, and the population as 203,780. In 1889 the population was estimated at 209,644. The capital is San José, with a population of 18,000. The revenue of the Republic in 1890 was \$4,300,000, and the expenditures \$4,200,000; foreign debt, \$13,000,000. The chief exports are coffee and bananas. Valuable metals exist in various parts of the country, and mining industry is making progress. In 1888 there were 180 miles of railway, and 420 miles of telegraph. Education is compulsory and free. In 1890 there were 300 primary schools with 15,000 pupils, besides 90 private schools with 2,500 pupils. The army consists of 600 men in time of

peace, and on a war footing can command 31,824 militia, as every male between 18 and 50 is bound to serve. The imports for 1889 amounted to 6,306,408 pesos, and the exports to 6,965,371 ps. To facilitate agricultural operations and immigration, a concession has been granted for an agricultural bank with a capital of \$5,000,000. The bank will not only make advances on the security of lands and produce, but will bring out colonists and settle them on lands which will be ceded to the company.

**COSTMARY** ("plant of Mary," *Balsamita vulgaris*), a perennial plant of the natural order *Compositæ*, sub-order *Corymbifera*, a native of the south of Europe, long cultivated in gardens for the agreeable fragrance of its leaves.

**COSTROMA**, or **KOSTROMA**, a town of European Russia, situated at the confluence of the Costroma with the Volga. It has manufactories of linen, leather, soap, and Prussian blue. Population, 27,187.

**COSWAY, RICHARD**, the most famous painter in his day, born at Tiverton, Devonshire, in 1740, died in 1821. As a miniature painter he was particularly famous, and gained nearly all the patronage of the nobility of his time. Many of his works were distinguished by great delicacy, correctness and beauty.

**COT**, on shipboard, a bed or hammock made of canvas, stiffened by a wooden frame, and having upright sides of the canvas, which forms a protection for the sleeper.

**COTGRAVE, RANDLE**, an English lexicographer, of whose life little is known save that he was a native of Cheshire, and was admitted scholar of St. John's College, Cambridge, in 1587; became secretary to William Cecil, Lord Burghley, and was living as late as 1632. He was author of our earliest French dictionary, the first edition of which appeared in 1611. Cotgrave's dictionary was a remarkable book for its time, and is still of great value to the philologist, not only as a storehouse of older English words, but because it fixes the actual forms of French words at the time when they were first borrowed.

**COTICE**, or **COST**, in heraldry, one of the diminutives of the bend. The cotice is the fourth part of the bend, and is usually borne in couples with a head between them.

**COTICE**, the French term to express that an escutcheon is divided bendwise into many equal parts.

**COTILLON**, the name of a brisk dance originated in France in the eighteenth century, consisting of a variety of steps and figures, known in the United States as the *german*. The term is now often used for several different kinds of quadrille.

**COTINGA**, a genus of birds of the family *Ampelidæ*, remarkable for the splendor of the plumage of the males during the breeding season. They are natives of South America, inhabiting moist places.

**COTONEASTER**, a genus of *Rosacæ* closely allied to the hawthorn and medlar. The species are shrubs or small trees, some evergreen; with simple entire leaves, more or less woolly beneath; small flowers in lateral cymes; and small, unpalatable bright-colored fruit, persistent in winter. *C. vulgaris* and other species are common mountain plants of Central Europe and Asia. They are all adapted for shrubberies.

**COTTA, BERNHARD** (1808-79), a German geologist. In 1842 he became professor at Freiburg; he wrote various valuable works on geology.

**COTTAGE CITY**, a summer resort of Massachusetts, and a noted camp-meeting ground, situated on the northeast shore of Martha's Vineyard, about thirty miles from New Bedford.

**COTTON, JOHN** (1585-1652), an Anglo-American clergyman. After preaching extensively in England, he came to the United States in 1633, and settled in Boston, Mass. Within a fortnight after his arrival he became connected with the first church in Boston, and retained this connection until his death. He wrote various important works on religious subjects.

**COTTON CROP IN THE UNITED STATES**. For general article on Cotton and Cotton Supplies, see *Britannica*, Vol. VI, pp. 482-508. The statistical returns of the cotton crop in the United States for the last ten years are as follows: In 1880, 5,757,307 bales; 1881, 6,589,329; 1882, 5,435,845; 1883, 6,992,234; 1884, 5,714,052; 1885, 5,669,021; 1886, 6,550,215; 1887, 6,513,624; 1888, 7,017,707; 1889, 6,935,082; 1890, 7,313,726. These returns are for the years ending September 1. The average net weight per bale is 440 lbs. The exports of cotton to Europe for the last seven years have been as follows: In 1884, 3,880,406 bales; 1885, 3,898,905; 1886, 4,296,825; 1887, 4,414,326; 1888, 4,602,248; 1889, 4,700,198; 1890, 4,885,326. During the same period there were exported from the United States to Canada from 1,764,326 bales to 2,431,757 bales per year—the lowest amount being in 1885, and the largest in 1890. The total export of cotton to Europe and to Canada in 1890 was 7,317,083 bales. The total cotton consumption of the entire world during the year 1890 was 11,035,000 bales. Of this amount Great Britain used 4,027,000; Continental Europe, 4,277,000; the United States 2,731,000. Ellison & Co. report the estimated sources of cotton supply for the year 1891 as follows: From America, 7,434,000 bales; East Indies, 1,740,000 bales; Egypt, 460,000 bales; Brazil and West Indies, 290,000 bales; Smyrna, 40,000 bales; Total, 9,964,000 bales, with an average weight of 455.1 lbs. The number of spindles in operation in 1886 was: Great Britain, 42,700,000; European Continent, 22,900,000; United States, 13,350,000; East Indies, 2,260,000; total, 81,210,000. Great Britain, 43,750,000 spindles; Continent, 24,755,000; United States, 14,550,000; East Indies, 3,270,000; total, 86,145,000.

**COTTON-GRASS** (*Eriophorum*), a genus of plants of the natural order *Cyperacæ*, common in swampy land. It has spikes resembling tufts of cotton, and the cottony substance has been used for stuffing pillows, making candle-wicks, etc.

**COTTON-RAT**, a rat of the order *Rodentia*, belonging to the family *Muridæ*, for which see *Britannica*, Vol. XV, p. 418.

**COTTON-SEED AND COTTON-SEED OIL**, products from the cotton plant, of which there are several species. The best known and most valuable are the *Gossypium*, *Barbadense*, *Herbaceum*, et al. The seed has an irregular, oval form, and measures about 1-6 by 1-3 of an inch. As it comes from the cotton gin there clings to it a delicate, linty fiber. An average of 22 pounds of short lint is ordinarily taken from a ton of seed. This product, called "linters," brings from six and a half to seven cents a pound, and is principally used in the manufacture of cotton batting. The hulls of the seed are used as fuel for the engines which furnish the power for the mills extracting the oil. It is generally estimated that three to four bushels of seed will afford one bushel of hulls, while the average percentage of oil is put at 15 to 20 per cent., and sometimes as high as 25 per cent.

The cotton plant has been known for hundreds of years, but no use was made of its products except the fiber from the boll until a very late period. It has been demonstrated that every part of the plant is valuable and available in many ways. The fiber of the plant-stalk can be made



into a coarse bagging of great strength; the root is susceptible of use in dyeing and pharmacy; the seeds are valuable in many ways besides the production of oil, and the oil is growing more and more valuable as its peculiar properties are being developed. The utilization of cotton seed was attempted in 1770, and samples of oil were exhibited by the Moravian brotherhood in Bethlehem, Pa. Before that time the seed had been regarded worthless, and the majority of planters allowed it to rot on the ground. Some few had discovered its nutritive qualities, and utilized it as food for their cattle, sheep, and horses, although horses did not take to it as kindly as the other stock. By some it was fed raw, while others boiled it for their animals, but the great majority disposed of the accumulations of seed piles by digging furrow-trenches and burying the refuse seeds in the rows over which the next crop of cotton would be planted. For ages the seed was but a waste product and cumbered the premises.

The use of cotton-seed meal as food for horses and other stock is increasing largely from year to year. In its composition it is similar to the flat beans, which form so important an item of horse-feed in England. But it is a highly concentrated food, and great caution is necessary in its use. It is sprinkled on cut and dampened hay, straw, or corn fodder, not more than half a pound of the meal at first, increasing slowly until the amount is four pounds, or even more, per day, for a horse of ten to eleven hundred pounds.

Cotton-seed meal free from hulls contains about seven per cent. of nitrogen. The hulls are especially rich in potash, the ashes of the hulls having 36 or more per cent. of potash in them. Acid phosphate supplies from 10 to 18 per cent. of phosphoric acid. A mixture of the phosphate, cotton seed, and the ashes of the hulls, which are procured at the oil mills, or the hulls themselves in compost, would be a complete fertilizer for any crop. As watermelons do not require potash in larger quantity than the soil of South Carolina naturally contains, a mixture of the cotton meal and the phosphate would make a good fertilizer for that crop.

In 1785 the Society for Encouragement of Arts and Commerce offered a prize for the manufacture of cotton-seed oil on a commercial scale; in 1851 specimens of oil and cake were placed in the English Exhibition. In 1852 cotton-seed oil was exported from Egypt to France; in 1880 a patent was granted in the United States on a process for extracting the oil from the seed; in 1884 the first attempts to extract oil as a merchantable product were made at Natchez, Miss.; in 1885, L. Klapp produced a decorticating machine which separated the hulls from the kernels, and since that time the production of oil has become an enormous industry. The seed, after being cleared of the adhering lint, is passed into a "decorticating" or hulling machine, in which the seed is cut open by knives of steel, or chilled iron. A solid cylinder armed with the knives revolves within a second cylinder, also armed with knives, playing in opposition. Revolving wire screens separate the kernels from the hulls. The hulls are crushed between iron rollers and are then ready for the pressing. The first oil product is thick and turbid, has a deep brown-red color and a slimy sediment. Subsequent processes produce the following grades: Crude oil, summer yellow, summer white, winter yellow and winter white. Cotton-seed oil consists chiefly of palmitin and olein. The elementary composition is given as—

|                                |                 |
|--------------------------------|-----------------|
| Carbon.....                    | 76.4 per cent.  |
| Hydrogen.....                  | 11.4 " "        |
| Oxygen.....                    | 12.2 " "        |
| Specific gravity at 60° F..... | 0.922 to 0.930. |

The refined oil has been largely introduced into general use for various purposes, including its substitution when highly refined for olive oil in table use. It is also largely used as a substitute for lard, being cheaper, more delicate, preserving its sweetness longer, and involving less risk of injury to health.

In the arts, cotton-seed oil stands midway between the drying and the non-drying oils. In its drying properties it is inferior to linseed oil. It is used as an adulterant, or as a substitute for various oils, such as linseed, sperm, lard, olive, almond, etc., also for treating leather. In dressing wool, as a lubricant, an illuminant, and in soap making. It is officially stated that nine-tenths of the "salad oil" in use in the United States consists wholly of cotton-seed oil. In 1881-82 the Italian government put a high import duty upon it, evidently with the intention of preventing the adulteration of olive oil.

One hundred pounds of cotton-seed will afford an average of

|                    |            |
|--------------------|------------|
| Lint or hulls..... | 46 pounds. |
| Cake.....          | 38 "       |
| Crude oil.....     | 16 "       |
|                    | 100        |

The cake is an extremely important product. It contains when prepared from the hulled seed—

|                         |          |
|-------------------------|----------|
| Moisture.....           | 9 parts. |
| Albumenoids.....        | 43 "     |
| Oil.....                | 15 "     |
| Crude fiber.....        | 4 "      |
| Other constituents..... | 22 "     |
| Mineral matter.....     | 7 "      |
|                         | 100      |

Cows fed with meal made from the cake show an improvement in the quantity and quality of milk; beef is greatly improved; but for cows carrying young its free use is not deemed advisable, it being productive of miscarriage. In 1881, 150,000 barrels of oil were exported, three-quarters of which were shipped to France and Mediterranean ports. The home consumption is estimated at from 40,000 to 60,000 barrels per annum. The value of the cake is put at about \$6,000,000 annually. In 1889-90 the oil produced in the United States was valued at \$12,886,305, and the lint, hulls, and oil cake at \$11,860,509.

COTTONWOOD SPRINGS, a popular health and pleasure resort of Colorado, about five miles from Buena Vista. It is noted for its medicinal springs and for its charming scenery.

COTTON-WORM, a common name for the larva of *Aletia xyliana*, which is in some years very destructive to the cotton crop of the United States and of Central and South America. The caterpillar is green, with yellow stripes and black dots, and grows to a length of an inch and a half. The boll-worm, the caterpillar of an allied form, is also very destructive to cotton-buds and other crops.

COUCHANT in heraldry, a beast lying down, with his head up. If the head is down, he is dormant.

COUCH-GRASS (*Triticum repens*), a species of grass common in Europe and North America, known to farmers as a troublesome weed; it spreads over the field with great rapidity, and on account of its tenacity of life is eradicated with difficulty. The roots are sweet and mucilaginous, and are collected at Naples for feeding horses.

COUCY, RENAUD, CASTELLAN OF, a court-poet belonging to the North of France, who flourished in the latter part of the 12th century. He became a crusader; it is supposed that he accompanied Philippe Auguste and Richard Cœur de Lion to the Holy Land, probably in the service of Raoul, Sieur de Coucy, with whom he is often confounded.

COUES, ELLIOTT, an American naturalist, born in 1842. He entered the United States army in 1862 as medical cadet, and from 1864 to 1881 was assistant surgeon. He was in 1869 professor of comparative anatomy at Norwich University, Vt., and in 1873, surgeon and naturalist in the United States northern boundary commission. Subsequently he was collaborator at the Smithsonian Institution; secretary and naturalist to the United States geological and geographical survey of the Territories; professor of anatomy in the National Medical College; and professor of biology in the Virginia agricultural and mechanical college. Prof. Coues is a member of several scientific societies, and has written many papers on scientific subjects.

COULANGES, FUSTEL DE, a French essayist, born in 1830. He became a professor of history in the University of Strasbourg in 1859, and in 1879 a professor at the Sorbonne. His published essays are principally on historical subjects.

**COUNCIL BLUFFS**, a city of Iowa, and county-seat of Pottawattamie county (see Britannica, Vol. VI, p. 512). The city was incorporated in 1853, and is now the largest city in the western part of the State. It contains a fine court-house and other county buildings; a Roman Catholic seminary, a high school, several graded schools, and a State institution for deaf mutes, founded in 1855. Its manufactories produce iron, paper, agricultural implements, machines, carriages, etc. Population in 1880, 18,063; in 1890, 21,338.

**COUNCIL GROVE**, the county-seat of Morris county, Kan., located on the Neosho River. It is a large shipping-point for cattle, hogs, and grain.

**COUNCIL OF WAR**, a conference of officers on some matter in which the commander wishes to fortify his judgment by an appeal to that of others. The governor or commandant may summon the heads of departments to meet him in consultation whenever he may think such a step desirable.

**COUNSELOR**, a name applied, in the United States to lawyers who have been admitted to practice in the higher courts. It most nearly corresponds to barrister in England, and advocate in Scotland.

**COUNTERFEITING MONEY**. The United States Congressional Act of Feb. 10, 1891, enacts that every person who makes, aids in making, or causes to be made, or has in his possession with fraudulent intent, or permits to be used any die, hub or mould, of any substance whatever, in likeness of any die, hub or mould used for coining United States coins, shall be fined not more than \$5,000, or imprisoned at hard labor for not more than ten years, or both. In the case of foreign coins, the fine is \$2,000, and the imprisonment five years, or both. Any person making or having in his possession, with intent to use in any manner, any business or professional device whatsoever in likeness of United States or foreign coins, may be fined \$100. United States judges and commissioners may authorize officers to enter any place, in the daytime only, to search for counterfeiters or implements. All counterfeiters and implements discovered are confiscated by the Government.

**COUNTERMINE**, a gallery or chamber excavated under the glacis or some other part of a defense-work of a fortress. Its purpose is to foil a besieger.

**COUNTER-PASSANT**, in heraldry, two beasts passing each other the contrary way.

**COUNTER-PROOF**, an impression which is obtained from a freshly printed proof of an engraving, by laying it, before the ink is dry, upon plain paper, and passing it through the press.

**COUNTERSIGN**, a signal, in the form of a word or phrase given to sentinels with orders to let no one pass unless he gives that sign.

**COUNTER-SIGNATURE**, the signature of a secretary, minister or other subordinate, to any writing signed by the principal or superior as a guaranty for its authenticity.

**COUNTER-TENOR**, the highest adult male voice, and the lowest female voice. Alto or contralto is the correct term.

**COUNTER-VAIR**, an heraldic fur. It differs from *vaire* by having its cups or bells of the same tinctures placed base against base, and point against point.

**COUNTRY DANCE**, a dance in which as many couples take part as can be accommodated by the space allotted them. The partners are arranged opposite each other in lines, and dance in couples down the lines and back to their original places. The name comes from the French *contre dance*, of which term it is a corruption.

**COUNTY**. See Britannica, Vol. VI, pp. 12-14.

**COUNTY RATE**, a local tax levied in Great Britain and Ireland for the purpose of defraying the expenses to which counties are liable, such as the maintenance of bridges, jails, lunatic asylums, coroners, etc.

**COUP**, a French word signifying "stroke," used in English in various French phrases; as, *coup d'état*, stroke of state; *coup de main*, a stroke of the hand; *coup d'œil*, a stroke or glance of the eye; and *coup de soleil*, a sunstroke.

**COUPED**, in heraldry, is used to describe the head or any limb of an animal cut off from the trunk, and smooth. It is distinguished from *erased*, that is, forcibly torn off, and therefore ragged and uneven.

**COUPLE**, the name given in statics to a pair of equal forces acting on the same body in opposite and parallel directions. The effect of a couple is to rotate the body about a certain definite line (the axis) perpendicular to the plane in which the forces constituting the couple lie.

**COUPLET**, any two lines which rhyme together, but more frequently used to denote two lines which contain the complete expression of an idea.

**COUPLING**, an organ register, by which two or more rows of keys can be connected by a mechanism, so that they can be played together.

**COUPON**, a term signifying any slip of paper cut from its counterpart. It is, however, applied chiefly to a dividend or interest warrant, which is presented for payment by holders of debentures.

**COURANT**, in heraldry, always used for running. Specifically said of a horse or other beast so represented.

**COURBET**, GUSTAVE, a French painter, born at Ornans, Franche-Comté, June 10, 1819, died at Vevey, Switzerland, Dec. 31, 1877. His hunting scenes and animal subjects are vigorous and spirited. They created a great sensation when shown in the Salon of 1850.

**COURBEVOIE**, a town of France in the department of Seine, about 5 miles northwest of Paris. Its chief manufactures are white lead and brandy. Population, 11,811.

**COURGNE**, a market-town of Piedmont, 12 miles southwest of Ivrea. Population, 5,600.

**COURTIERS**, a term applied to persons hired to accompany travelers abroad. Their special duty is to make all arrangements for the journey, and to relieve their employers as far as possible of all anxiety about passports, exchange of money, hotel negotiations, and the like.

**COURSE**, in building, a continuous range of stones or bricks of uniform thickness.

**COURSES**, on shipboard, a name given collectively to all the lower sails. The courses comprise the mainsail, foresail, main-staysail, fore-staysail, and mizen-staysail.

**COURT**. See Britannica, Vol. VI, pp. 516-17.

**COURTALLUM**, a town of the district Tinnelly, in the presidency of Madras, near the junction of the eastern and western Ghats.

**COURT-HAND**, the name given to the old Gothic or Saxon handwriting used in records and judicial proceedings in England.

**COURTLAND**, a town of Alabama, 45 miles west of Huntsville. It is the seat of two academies, and contains a number of steam mills.

**COURTNEY**, LEONARD HENRY, M. P., born at Penzance, in Cornwall July 6, 1832, graduated in 1855 at St. John's College, Cambridge, as second wrangler and first Smith's prizeman, and became fellow of his college the following year. In 1858 he was called to the bar, and from 1872 to 1876 he filled the chair of political economy at University Col-



lege, London. Elected to Parliament as Liberal member for Liskeard (1876-85), he was successively under-secretary of state for the home department, under-secretary of state for the colonies, and financial secretary to the treasury. Elected in the Liberal interest as a member for Southeast Cornwall in 1885, he was reelected as a Liberal-Unionist in 1886, and was made privy councillor in 1889.

COUSIN, a kinsman; more especially the son or daughter of an uncle or aunt. The children of brothers or sisters are *cousins-german* (german being the Lat. *germanus*, "brother"). The children of cousins-german are *second cousins*; and if A and B are cousins, A is *first cousin once removed* to the children of B, as B is to the children of A.

COUTRAS, a town of France in the department of Gironde, situated on the left bank of the Dronne. It has considerable trade in flour, and the district produces red wine. Population, 2,200.

COUTURE, THOMAS (1819-1879), a French artist who very early attracted attention and admiration, and whose famous painting *La Décadence des Romains*, now at the Luxembourg, inaugurated an era in the art of Paris. Influenced by the classicism of David, but still more by the new era that succeeded the return of the house of Orleans, Couture took a classic subject and treated it with the glowing spirit, the free brush, and the unbridled license of a Rubens. What was ostensibly a moral lesson was in reality a seduction to the pure. Couture, however, was a great painter.

COVENANT: in law, an agreement by deed in writing, signed, sealed and delivered.

COVINGTON, a town of Georgia, county-seat of Newton county, about forty miles east of Atlanta. It is the seat of the Southern Masonic Female College.

COVINGTON, a railroad town and county-seat of Fountain county, Ind., on the Wabash River and Wabash and Erie Canal. It has coal companies and a foundry.

COVINGTON, a city of Kentucky, and county-seat of Kenton county (see Britannica, Vol. VI, p. 531). Its principal public buildings are a new United States court-house, city hall, high school, Roman Catholic hospital, founding asylum, orphanage, convent and two Roman Catholic academies. It has also a large public library. A suspension bridge 2,252 feet in length, and costing \$2,000,000 crosses the Ohio River at this point. Population in 1880, 29,720; in 1890, 37,375.

COWAGE, or COWHAGE, short, slender, brittle hairs, which grow on the pods of plants of the genus *Mecuna*, of the natural order *Leguminosæ*. The hairs readily stick to the skin, and produce intolerable itching. Cowage is employed medicinally as a mechanical vermifuge.

COW-BIRD (*Molothrus pecoris*), also called cow-pen bird, cow blackbird, etc., a native of North America, nearly allied to the Troupials, remarkable for its cuckoo-like habit of utilizing the nests of other birds. The cow-bird is about seven inches in length, predominantly brownish-black in color, and has a short but sharp-pointed beak. The females are far more numerous than the males, and polygamy is therefore in vogue. The males have deeper, glossier coats than the females. It is said to damage the fields of sown maize, but feeds largely on insects. The name refers to its habit of frequenting cow-pens for the sake of the attracted insects.

COWBRIDGE, a town of Wales, in the county of Glamorgan, situated on the river Ddan, 12 miles west of Cardiff. Population, 1,100.

COWLEY, HENRY RICHARD CHARLES WELLESLEY, EARL, born June 17, 1804, died July 14, 1884.

He was successively secretary and ambassador at Constantinople, minister plenipotentiary to Switzerland (1848), to the Germanic Confederation (1851), and in 1852 he became ambassador at Paris. He was created Earl Cowley in 1857, and made a Knight of the Garter in 1866.

COWPENS, a village of Spartanburg county, S. C., important as the battle-field where General Morgan's forces defeated Tarleton's, Jan. 17, 1781.

COW-PLANT (*Gymnema lactiferum*), a perennial plant of the natural order *Asclepiadaceæ*, a native of Ceylon. The milky juice was supposed to be used as a substitute for milk by the Singhalese.

COW-TREE, a name given to a number of trees of different natural orders, the juice of which is used instead of milk. The most famous of these is the Palo-de-Yaca, *Galactodendron (Brosimum) utile*, of the Cordilleras and Caraccas. The milk is obtained by piercing the bark of the trunk or branches. It has an agreeable taste, somewhat like that of cow's milk, and its nutritive value is considerable. It is much used by the negroes and Indians.

COW-WHEAT, a genus of plants of the natural order *Scrophulariaceæ*, having an oblong two-celled capsule, with a few seeds somewhat resembling grains of wheat.

COX, ISAAC N., of Ellenville, N. Y., a merchant, born in Tallsburgh, N. Y., Aug. 1, 1846. He received an academic education; in politics was a Democrat; was elected a supervisor of his town in 1875, 1883-86, being chairman of the board the latter year; was a member of the Democratic State Committee; in 1890 was elected a Representative from the Seventeenth Congressional District of New York to the 52d Congress.

COX, SIR GEORGE WILLIAM, an English clergyman and historian, born in 1827. He was ordained in 1850, and for several years was a curate. In 1860 he became assistant master in Cheltenham College. He has written several valuable histories.

COX, JACOB DOLSON, an American statesman, born in 1828. He was admitted to the bar in 1853 and settled in Warren, O. From 1859 to 1861 he was a member of the State Senate, and held a State commission as brigadier-general of militia. At the beginning of the civil war he entered the Union army, and was present in many important battles. In 1863 he was commissioned major-general. He was governor of Ohio in 1866-67, and Secretary of the Interior, 1869-70. He was elected president of the Wabash Railroad in 1873, and from 1877 to 1879 was a member of Congress. Gen. Cox has published *Atlanta*, and *The March to the Sea*.

COX, SAMUEL, an English Baptist minister, born in 1826. In 1851 he became pastor of the church in St. Paul's Square, Southsea, and in 1855 went to Ryde. After he had been at this last-named place about four years, his health failed him, and he virtually gave up preaching and devoted himself to authorship. His subjects are principally Scriptural.

COX, SAMUEL HANSON (1793-1881), an American clergyman. He studied law in 1812, but later studied theology, and in 1817 was ordained pastor at Mendham, N. J. In 1821 he settled in New York. He was pastor of various Presbyterian churches in that city and took a leading part in the establishment of the University of the city of New York. In 1833 he visited Europe, and delivered a series of lectures. In 1834 he became professor of pastoral theology in the Theological Seminary at Auburn, and in 1837 was made pastor of the First Presbyterian congregation in Brooklyn. He was for years connected with the faculty of the Union Theological Seminary of New York city.

COX, SAUMEL SULLIVAN, an American statesman, born in 1824, died Sept. 10, 1889. In 1853 he became the editor of the Columbus, Ohio, "Statesman," and from 1857 to 1865 was a member of Congress. In 1866 he became a resident of New York city, and in 1868 was elected to Congress, and reelected three times. In 1872 he was elected as candidate at large for the State, and reelected in 1874, 1876, 1878 and 1880. In 1885 he was made Minister to Turkey, but returned to the United States in October of the following year, and in November was again elected to Congress. He was twice reelected, and was a member of the House of Representatives at the time of his death. He was the founder of the Life-saving Service, and the author of several works on political and other subjects.

COXE, ARTHUR CLEVELAND, an American P. E. bishop, born in 1818. He studied theology, became a deacon in 1841, and the following year was made priest. From 1843 to 1854 he was rector of St. John's church, in Hartford, Conn., and then of Grace church, Baltimore, Md. In 1863 he accepted the rectorage of Calvary church, New York city, and a year later became assistant bishop of Western New York. In 1865 he succeeded bishop DeLancey as the second bishop of Western New York. Bishop Coxe has published extensively in both prose and verse.

COXE, JOHN REDMAN (1773-1864), an American physician. He studied medicine in the United States and in Europe, and in 1796 settled in Philadelphia. For several years he was a physician in the Pennsylvania hospital, and later in the Philadelphia dispensary. In 1809 he became professor of chemistry in the University of Pennsylvania, and from 1818 to 1835 was professor of materia medica and pharmacy in the same institution. He published many works on medicine and kindred subjects.

COXE, TENCH (1755-1824), an American political economist. He joined the militia at an early age, but in 1776 resigned to become a loyalist. He next turned Whig, and in 1786 was sent to the Annapolis convention, and two years later to the Continental Congress. In 1788 he turned Federalist, and in 1800, Republican. In 1789 he was Assistant Secretary of the Treasury, in 1792 Commissioner of the Revenue, and in 1803 Purveyor of Public Supplies. He wrote many important works on political economy.

COXSACKIE, a town of Greene county, N. Y., on the Hudson River, 22 miles south of Albany. It is extensively engaged in brick manufacturing.

COYPU. See *Britannica*, Vol. XV, p. 20, and Vol. XVI, p. 301.

CRAB, ROGER, hermit, born about 1621 in Buckinghamshire, died at Bethel Green, Sept. 11, 1680. He believed it sinful to eat any kind of animal food, or to drink anything stronger than water. In 1651 he took up his residence in a hut and subsisted on bran, turnip-tops, dock-leaves, and grasses. He published *The English Hermit, Dagon's Downfall*, and a tract against Quakerism.

CRAB-APPLE, a term applied somewhat vaguely to any sour and uncultivated variety or species of apple; more strictly, however, to the wild varieties of the true apple (*P. malus*, var. *sylvestris*).

CRACKED HEELS. From careless grooming, washing horses' legs and imperfectly drying them, permitting them to stand in accumulations of filth or exposed to draughts, the skin becomes inflamed, tender, itchy, thickened, and by and by cracked. An ichorous discharge exudes, and lameness often results.

CRACKLIN, a variety of chinaware whose enamel is covered with fine cracks.

CRACOVIANNE, the national dance of the Polish peasantry. It is of a graceful and fanciful character, somewhat like the mazurka.

CRAIG, a local term given specially to those masses of shelly sand which have been used from very ancient times in agriculture to fertilize soils deficient in calcaearous matter.

CRAIG AND TAIL, a term used to designate a peculiar hill conformation in which a bold and precipitous front exists on one aspect of a hill, while the opposite is formed of a sloping declivity. It is believed to have been in most cases caused by moving ice.

CRAIK, DINAH MARIA (Mulock), an English novelist, born in 1826. Her first novel appeared in 1849 and received some favor, as did those which immediately followed; but not until the publication of *John Halifax, Gentleman*, in 1857, did she achieve a decided success. She has written numerous other popular novels. She died in 1887.

CRAIK, GEORGINA M., an English novelist, born in 1831. She wrote for various periodicals, and in 1857 appeared her first novel, *Riverston*. She has since written numerous other important books, many of which are for children.

CRAKE. See *Britannica*, Vol. VI, pp. 542-43.

CRAMBE, a genus of plants of the natural order *Cruciferae*, natives of Europe and Western Asia. They have been used as a pot-herb from ancient times. The young shoots and blanch leaves are cooked and served like asparagus.

CRAMPTON'S GAP, a pass in the South Mountains near Burkittsville, Franklin county, Md. McClellan's army defeated the Confederates at this point, Sept. 14, 1862.

CRANBROOK, GATHORNE, VISCOUNT, born Oct. 1, 1814, at Bradford, England, educated at Shrewsbury and at Oriel College, Oxford. He was called to the bar in 1840, and in 1856 was returned as a Conservative by Leominster. In 1865 he defeated Mr. Gladstone in the celebrated Oxford University election. He was under-secretary of state for the home department 1858-59, president of the poor-law board 1866-67, home secretary 1867-68, war secretary 1874-78, secretary of state for India 1878-80, and lord president of the council 1885-1889.

CRANE. See *Britannica*, Vol. VI, pp. 546-47.

CRANK, in machinery, a lever or arm on a shaft, driven by hand (e. g., a winch-handle) or by a connecting-rod, its object being to convert reciprocating motion into rotary motion.

CRANE, CHARLES HENRY, a distinguished American surgeon, born in Newport, R. I., in 1825, died in 1883. He graduated at Yale College and at Harvard Medical School. He entered the United States army in 1847, as acting assistant surgeon. In May, 1861, he was promoted surgeon, and in June, 1862, was appointed medical director in the department of the South. In the following year he was transferred to the surgeon-general's office in Washington, and in 1866 was appointed assistant surgeon-general, with the rank of colonel. July 3, 1882, he became surgeon-general, which position he held until his death.

CRANE, WILLIAM CAREY, a distinguished Baptist clergyman and educator, born at Richmond, Va., in 1816, died in 1885. He graduated at Columbia College and at Hamilton Theological Seminary. He was ordained in 1838, and for several years was pastor of various Baptist churches in Alabama, Mississippi, and Texas. Subsequently he became president of Mississippi Female College, of Semple Broadus College, of Mount Lebanon College, and of Baylor University, which latter position he occupied at the time of his death. "Crane College,"



at Independence, Texas, was named after this eminent divine.

GRAPE MYRTLE, a handsomely thraceous shrub of the genus *Lagerstræmia*, otherwise known as the Indian Lilac. It is a native of China, but has been successfully cultivated in the United States. It bears beautiful large rose-colored flowers.

CRAPO, HENRY H., born at Dartmouth, Mass., in 1804, died in 1869. He removed to Michigan in 1857, engaged extensively in the lumber business and held several important political offices. He served as mayor of Flint, Mich., as State Senator, and was governor of the State for two terms, 1864-68.

CRASSULACEÆ, a natural order of exogenous plants, remarkable for their succulency. About 300 species are known, among which are the houseleek, stone-crop, roseroot, etc. They are distributed all over the world, chiefly in South America.

CRATER, the central cup-shaped cavity in the summit of a volcano through which the lava, stones, scoria, etc., are ejected. Some craters have a very regular form, while others are broken down more or less on one side.

CRAVEN, TUNIS AUGUSTUS MACDONOUGH, a distinguished American navy officer, born at Portsmouth, N. H., in 1813, died in 1864. He entered the United States navy in 1829, and served in different vessels, and in various capacities until 1857, when he commanded the Atrato expedition for the purpose of surveying the Isthmus of Darien. Subsequently he was engaged as commander of the *Mohawk* in the suppression of the slave trade. He was very efficient in rendering assistance to merchant vessels, and for his service in this direction the New York board of underwriters presented his wife with a silver service of plate, while the Queen of Spain presented him with a gold medal. In 1861 he commanded the *Tuscarora* while engaged in the search for Confederate cruisers. Subsequently he was given command of the monitor *Tecumseh*, and was attached to Admiral Farragut's squadron in the attack on Mobile. In the battle which followed his vessel was accorded the post of honor. While attempting to attack the Confederate ram *Tennessee*, the *Tecumseh* was destroyed by a torpedo, and sank with nearly all on board. The general orders directed the commanders of the different vessels to pass to the eastward of a certain buoy in order to avoid the torpedoes; but Com. Craven, in his eagerness to engage the ram, had ordered the monitor to pass to the westward of the buoy. It is related of the brave commander that while the vessel was sinking he and his pilot, John Collins, met at the foot of the ladder leading to the top of the turret. Craven, knowing it was by his own command that the fatal change in the vessel's course had been made, stepped back, saying: "After you, pilot." The result was, the pilot escaped, and the commander went down with the ship.

CRAVEN, THOMAS TINGEY (1808-87), an American naval officer. He entered the navy in 1822; became sailing-master of the *Erie* in 1828; commissioned lieutenant in 1830, and in 1838 commanded the *Vincennes*. He subsequently served on the *Boxer*, *Fulton*, *Monroe*, *Macedonia*, *Porpoise*, *Ohio*, and *Independence*, and commanded the *Congress*, *Brooklyn*, and *Niagara*. In June, 1861, he was assigned to the command of the Potomac flotilla, and while in command of the *Brooklyn* took a prominent part in the capture of New Orleans. He was commissioned as rear-admiral in 1866, and placed in command of the navy yard at Mare Island, Cal. He was retired in 1869.

CRAWFORD, GEORGE WASHINGTON, an American statesman, born in Columbia county, Ga., 1798.

He graduated at Princeton College in 1820, and was admitted to the bar in 1822. For four years, 1827-31, he was attorney-general of Georgia. With the exception of one year he was a member of the State legislature, from 1837 to 1842, and in 1843 was elected to Congress. During the same year he was elected governor of Georgia, and reelected in 1845. In March, 1849, President Taylor appointed him Secretary of War, which position he held until the death of the President, which occurred July 9, 1850. He has since lived in retirement at his home in Richmond county, Ga.

CRAWFORD, SAMUEL WYLIE, an American soldier, born in Franklin county, Pa., 1829. A graduate of the University of Pennsylvania, he became an assistant surgeon in the United States army in 1851. In 1860 he was stationed at Fort Sumter, and had command of a battery during the bombardment of that fort at the outbreak of the civil war. In 1862 he vacated his commission as assistant surgeon, and accepted the appointment of major in the 13th N. Y. infantry. Shortly afterwards he was commissioned brigadier-general of volunteers, and brevetted from colonel in 1863 to major-general in 1865. He rendered efficient service in the Shenandoah campaign, and was conspicuous for his bravery in the battles of the Wilderness, Winchester, Cedar Mountain, Spottsylvania, Petersburg, Five Forks, and other engagements. In 1873 he was retired with the rank of brigadier-general.

CRAWFORD, WILLIAM, a Revolutionary soldier, born in Virginia in 1732, died in 1782. Served in the French and Indian war as an ensign. During the Pontiac war he served as captain, having been promoted on the recommendation of Washington. During the Revolutionary war he raised a company of Virginians, and joined Washington's army. For several years after the close of the Revolutionary war he was engaged in defending the frontier settlements against the attacks of the Indians, and in 1772 was captured by the latter, and after several days of cruel torture, was burned to death.

CRAWFORD, WILLIAM HARRIS (1772-1834), an American statesman. He began the practice of law in Lexington, Ga., in 1799. In 1802 he was made a member of the State Senate, and in 1807 of the United States Senate. He was reelected in 1811, and in 1813 became minister to France. In 1816 he was appointed Secretary of the Treasury, and in 1824 was a candidate for President, but was defeated by John Quincy Adams. On his return to Georgia he became circuit judge, retaining this office until nearly the end of his life.

CRAWFORDSVILLE, a city and railroad center; also the county-seat of Montgomery county, Ind. It is the seat of Washash College.

CREASY, SIR EDWARD SHEPHERD, English author, born at Bexley in Kent, in 1812, died in London, Jan. 27, 1878. From Eton he passed to King's College, Cambridge, in 1832, and in 1834 was elected a fellow. Called to the bar in 1837 he practiced on the home circuit for more than twenty years, presided for several years as assistant judge at the Westminster sessions court, and in 1860 was appointed chief-justice of Ceylon, and knighted. Creasy was the author of *The Fifteen Decisive Battles of the World* (1851), *Invasions of England* (1852), *History of the Ottoman Turks* (1854-56), etc.

CREDESCENCE, in the Roman Catholic and Anglican churches, a small table beside the altar or communion-table, on which the bread and wine are laid before being consecrated. Sometimes the place of the credence is supplied by a niche in the sanctuary wall. The term was also used for a side-board, on which the food was placed to be tasted

before serving, as a precaution against poison. Hence the origin of the word.

**CREDENTIALS**, papers or letters given to an ambassador, or other public minister, to a foreign court, to enable him to claim the confidence of the court to which he was sent.

**CREDIT**, **LETTER OF**, a term applied to a letter addressed to a correspondent at a distance, requesting him to pay a sum therein specified to the person named, or to hold the money at his disposal, and authorizing the correspondent to reimburse himself for such payment either by debiting it in account between the parties, or by drawing on the first party for the amount. This arrangement may take place between merchants or others, but in general it occurs between bankers residing in different places. It is designed to enable any one who has money lodged at one place to obtain the use of it at another for a small charge or commission, without the risk or trouble of actually carrying money between the two cities.

**CREEDMOOR**, a village of Long Island, 12 miles east of New York by rail, with an extensive rifle-range.

**CREEK**, in geography, the term applied to small inland rivers.

**CREEKS**. See **INDIANS, AMERICAN**, in these Revisions and Additions.

**CREEPER**, a genus of birds, the type of the family *Certhiade*. The best known North American species are the brown creeper (*Certhia Americana*) and the *Certhia albifrons* of the Southwestern States.

**CREEPS**, a miner's term for the depression which takes place on the surface from the removal of beds of coal beneath. Masses of the coal-seam, like huge pillars, are left by the miners for the support of the superincumbent strata.

**CREES**. See **INDIANS, AMERICAN**, in these Revisions and Additions.

**CREMATION**. See *Britannica*, Vol. VI, pp. 565-67.

**CRENELLE**, an embrasure or indentation in a battlement; an indentation.

**CRENIC ACID**, one of the constituents of vegetable mold, produced wherever leaves and other plant matter are decaying.

**CRESCENDO**, in music, a gradual increasing of sound, or changing from piano to forte and fortissimo. The swell of an organ, when well constructed, produces a most perfect crescendo.

**CRESCENT**, in heraldry, is used both as a bearing or charge, and as a difference. In the latter case, it designates the second son, and those that descend from him.

**CRESCENT**, a decoration, sometimes called order of, in Turkey. In 1799, after the battle of Aboukir, the sultan, Selim III, testified his gratitude to Nelson by sending him a crescent richly adorned with diamonds. It was not intended as an order, but Nelson wore it on his coat; and Selim, flattered by the value attached to his gift, resolved that a similar decoration should be conferred on foreigners who had done service to the state. There was an old order of the Crescent, instituted by Rene, Duke of Anjou, in 1464.

**CRESCENTINO**, a town of North Italy, in the province of Novara, 22 miles northeast of Turin, situated near the confluence of the Dora Baltea with the Po. It has manufactories of silk and woollens. Population, 6,300.

**CRESCO**, a railroad village, the county-seat of Howard county, Iowa. It is a great shipping point for wheat; it has foundries and other manufactories; also a good union school.

**CRESETT**, a lamp or torch, or a light fixed on a pole. The name owes its origin to the fact that beacons were usually surmounted by a cross.

**CRESSON**, a summer resort of Cambria county, Pa., situated on the top of Alleghany Mountains, 300 feet above the sea.

**CRESTE**, in architecture, an ornamental finishing, either in stone, or of tiles or metal, running along the top of a wall or the ridge of a roof.

**CRESTLINE**, a railroad junction in Crawford county, Ohio, where are located railroad shops and manufacturing establishments.

**CRESTON**, a city of Iowa, about two hundred miles west of Burlington. It is an important railroad and trade-center. It contains a variety of manufactories and large railroad shops.

**CRESWELL**, JOHN A. J., an American statesman, born in Port Deposit, Md., in 1828. He graduated from Princeton, and was admitted to the bar in 1850, a member of the State legislature, 1860-62, of Congress in 1863, and in the United States Senate in 1865. In 1869 President Grant made him postmaster-general, which position he held till 1874.

**CRETE**, a manufacturing city and railroad junction of Saline county, Neb. It is the seat of Doane College.

**CRÉTIN**, JOSEPH, R. C. bishop, born in Lyons, France, in 1800, died in St. Paul, Minn., in 1857. He studied in his native diocese, and in 1839 was appointed vicar-general at Dubuque, Iowa. From 1843 to 1849 he was at Prairie du Chien, among the Winnebagoes, when he was appointed to the new see at St. Paul, Minn., where later he erected a hospital, an asylum, and novitiate. Subsequently he established churches among several tribes of Indians, and erected a convent of the Benedictine order at St. Cloud, which has since grown into a great school and abbey. When he was appointed to Minnesota, there was in his diocese one log church and three priests. A few years later there were twenty-nine churches and twenty priests, with a Catholic population of more than 50,000.

**CREVAUX**, JULES NICHOLAS (1847-82), French explorer, born in Lorquin, Lorraine, in 1847. He became assistant surgeon in the French navy in 1865, and surgeon five years later. Subsequently he explored the Tumuc-Humac Mountains, and descended the Yaru to the Amazon. He afterwards explored the Yapoura, the Pilaya and the Pilcomayo Rivers. In April, 1882, while prosecuting his explorations in the region of the Teyo, he was murdered by the Tapeti Indians.

**CREVECEUR**, the name of a Dutch port in the province of North Brabant, on the left bank of the Meuse. It figured prominently in the wars of the Dutch and Spaniards.

**CREVILLENTE**, a town of Spain, in the province of Alicante. It has a population of about 7,800, chiefly engaged in agricultural pursuits and weaving.

**CREW**, a collective name for all the persons employed on a ship, but usually limited to designate non-commissioned officers and seamen.

**CREWKERNE**, a town in the southeast of Somersetshire, 10 miles southwest of Litchester. Population, 4,489.

**CRIB-BITING**, an injurious habit of horses, especially those spending a considerable amount of leisure in the stable. The act consists in seizing with the teeth the manger, rack or any other object, and taking in at the same time a deep inspiration with a peculiar noise known as wind-sucking. It usually interferes with thriving and leads to attacks of indigestion.

**CRILLON**, LOUIS DES BALBES DE BERTON DE, a French knight, surnamed "Le Brave," born at



Murs in Provence in 1541, died at Avignon in 1615. He distinguished himself in battles at Calais, Guines, Dreux, Jarnac and Moncontour, receiving numerous church benefices, as a reward for his heroism. His last days were spent in piety and penance.

**CRIMINAL LAWS.** See Britannica, Vol. VI, pp. 587-90.

**CRIMINALS, IDENTIFICATION OF.** While various systems have been in use from time immemorial for the identification of persons charged with crime, it remained for Alphonse Bertillon, of Paris, to perfect in 1882 a system that was adopted by the French government, affording a positive means of immediately recognizing and identifying a person who had ever at any time been examined according to the rules laid down in the code established by him. The measurements as established are applicable to individuals, tribes or races. The list embraces height, length and width of head, length of left middle and little fingers, forearm and foot, full stretch of arms, and length and breadth of right ear. All marks and scars are fully described, recorded and exact position noted; all peculiarities of the eyes and hair are given. In defining a scar its precise location is noted as being either on the right or left of the vertebral column, as well as above or below the plane of the seventh vertebra. For scars on the face the localities and measurements are reckoned from the nostrils, the bridge of the nose, the corners of the mouth, chin, cheek, eyebrows; on the breast, the median line, the nipples, the sternum, are taken as bases; for the arm the measurements are reckoned from the shoulder, elbow, wrist; for the fingers, the phalanges and articulations. It was found that in the measurements of 130,000 individuals by the police in Paris, no two cases were alike, and it was very seldom that the same kind of scar or mark was on two different persons in the same position. In the practical working of the system, three divisions are made: tall, medium and short. This is designated as the first classification. Each of these classes is further subdivided under head-measurement, followed in turn by other classifications and divisions until the whole number is divided into groups of about 10 persons each. As an example of the speed and accuracy with which a criminal can be identified, when he refuses to give his name, it is necessary to take, first, his height, thereby locating him in one of the grand divisions, tall, medium or short, and thereby locating the series of compartments or drawers where his recorded measurement and photograph are to be found. The measurement of the length of the head brings still nearer; the color of the eyes; the length of the outstretched arms, and the length of the foot will bring the searcher to the exact spot where the full description and pictures identify the culprit beyond a doubt. Two photographs are usually taken, one with a profile view, the second a three-quarter view.

The plan adopted by the police of the United States is regarded as an improvement and simplification of the methods as given in the foregoing description. The method in vogue for many years has been to take the height and weight; note the complexion; the color and any other peculiarity of the hair; the teeth, eyes, nose, etc. In the matter of the nose care is taken to describe it as either regular, irregular, Roman, pug or Grecian. All scars are located and described; birth marks and India-ink marks, with all deformities, and evidences of accidents are recorded. The measurements can be taken by one policeman, but for rapid work two are usually required; one for the

measuring and one for the recording. The instruments used are calipers, compasses and graduated rules, which, although inexpensive, are so exact that the diameters of the head and the length of the fingers can be given to within one millimeter. In searching for prominent criminals duplicate descriptions can readily be sent out, and accuracy secured beyond a doubt. Among scientists the name Anthropometry, from the Greek *anthropos*, a man, and *metron*, a measure, the department of the science of anthropology which relates to the proportions of the human body, is usually applied, but in ordinary life is seldom used.

**CRINED**, in heraldry, when the hair of a man or woman, or the mane of a horse, differs in tincture from the rest of the charge, the object is said to be crined of such a metal or color.

**CRINGLES**, short pieces of rope, with each end spliced into the bolt rope of a sail, confining an iron or brass ring or thimble. Smaller ropes are passed through them, to aid in managing the sails.

**CRINOLINE**, the name originally given by French modistes to a fabric of horsehair, capable of great stiffness, and employed to distend women's attire.

**CRINUM**, a genus of bulbous-rooted plants of the natural order *Amaryllidaceae*. There are about 60 species, natives of tropical and subtropical countries. *C. amabile*, an Indian species, is much esteemed for its fragrance and beauty. *C. Asiaticum* has powerful emetic bulbs, which are used in case of poisoning.

**CRISIS**, a name used by physicians to denote the rapid or sudden determination of an acute disease in the direction of convalescence or of death.

**CRITTENDEN, GEORGE BIBB** (1812-80), an American general, born in Russellville, Ky., March 20, died in Danville, Nov. 27. He served in the Texan revolution of 1835, and in the Mexican war, being one of the first to enter the City of Mexico. On the outbreak of the civil war he resigned his commission as lieutenant-colonel in the U. S. Army, and entered the Confederate service. He was commissioned brigadier-general and speedily promoted to major-general. An unsuccessful attack by his forces on the Union troops at Fishing Creek led to his severe censure, and soon afterwards he resigned his commission. After the war he resided in Frankfort, Ky., and was State librarian from 1867 to 1871.

**CRITTENDEN, JOHN JORDAN**, an American statesman, born in Woodford county, Ky., 1787, died July 26, 1863. He graduated at William and Mary College, and in 1809 was appointed attorney-general of the Territory of Illinois. He served as a volunteer in the war of 1812, and in 1816 was elected to the legislature. In 1817 he was elected to the U. S. Senate, serving three years, when he resigned and entered upon the practice of law at Frankfort, Ky., where he speedily became eminent, especially as a criminal lawyer. He served several terms in the State legislature, and in 1835 was again elected to the U. S. Senate. He was Attorney-General of the United States under President Harrison, and, after the death of the latter, was returned to the Senate to fill the vacancy caused by the retirement of Mr. Clay, and was subsequently reelected for a full term, but resigned in 1848 to become governor of Kentucky. After the death of President Tyler he again entered the cabinet as Attorney-General under President Fillmore. In 1855 he again entered the U. S. Senate, where he exerted to the utmost his influence to preserve the Union. He remained in the Senate until March 4, 1861, when he retired,

but was promptly returned to Congress as a member of the House of Representatives, where he was esteemed as one of the most able debaters.

**CRITTENDEN, THOMAS LEONIDAS**, an American soldier, born in Russellville, Ky., in 1815. He studied law with his father, John J. Crittenden, and became commonwealth's attorney for his native State in 1842. He served under Gen. Taylor in the Mexican war, and was consul at Liverpool from 1849 to 1853. On the outbreak of the civil war he entered the Union Army, and in 1862 was promoted major-general and given command of a division of the Army of the Tennessee. He subsequently served under Gens. Buell and Rosecrans, being in command of one of the two corps that were routed at Chickamauga. He resigned his commission in 1864, but entered the Regular Army two years later as colonel of the 32d Infantry. For his gallantry at Stone River he was brevetted brigadier-general in 1867. In 1869 he was assigned to the 17th Infantry, and served on the frontier until his retirement in 1881.

**CROCKETT**, a thriving city, the county-seat of Houston county, Texas. It has a male and female seminary.

**CROCKETT, DAVID**, an American pioneer, born in Green county, Tenn., in 1786, died in 1836. He lived with his parents until he was 12 years of age, when he was indentured to a German, with whom he tramped 400 miles. Disgusted with his occupation he ran away and returned home, and for several years worked for teamsters and drovers. When eighteen years of age he went to school for a few weeks and learned to read and write. In 1811 he removed to Franklin county, one of the wildest parts of the State, where he engaged principally in hunting, acquiring a reputation as one of the most skillful hunters of his age. In 1813 he served in the war with the Creek Indians, and at its close settled on Shoal Creek, and was appointed a local magistrate by his neighbors. In 1821 he was elected to the State legislature, and, although uneducated and entirely ignorant of the art of public speaking, made a most creditable record. He was returned to the legislature in 1823-24, and in 1826 was elected to Congress. He served two terms, and from 1833-35 served a third term. He was noted in Washington for his thorough independence, shrewdness, strong common sense and humorous eccentricities of manner. After his career in Congress he joined the Texans in their contest for independence, and was one of the 140 defenders of Fort Alamo, in San Antonio de Bexar, being one of the six survivors who surrendered to Gen. Santa Anna, and who were treacherously massacred by his orders.

**CROCUS OF ANTIMONY**, the oxy-sulphide of antimony. Crocus of Mars is the finely divided red oxide of iron.

**CROFTON, SIR WALTER FREDERICK**, an English prison reformer, born in 1815. In 1833 he entered the royal artillery, retiring in 1844 as captain. Subsequently he became interested in the improvement of prisons and reformatories. He has done much to advance the merits of refuges and reformatories throughout the civilized world. He was knighted by the Queen in 1862.

**CROGHAN, GEORGE**, an American soldier, born near Louisville, Ky., in 1791, died in 1849. He graduated at William and Mary College; entered the army in 1810; was promoted captain in 1812, and major in 1817. For his gallant defense of Fort Stephenson, at Lower Sandusky, he was brevetted lieutenant-colonel, and Congress voted him a gold medal. In 1817 he resigned from the army, and after filling several civic positions, he

joined Gen. Taylor in Mexico in 1846, taking part in the battle of Monterey.

**CROIA**, or **CROJA**, a town of Albania, Turkey, 42 miles southeast of Scutari. It is situated on a lofty mountain-spur, about 500 feet above the plain, and is defended by a strong castle. Population, 5,000.

**CROLY, DAVID**, an eminent American journalist, born in New York city, in 1820. He entered the profession of journalism about 1854, since which time he has been prominently connected, either as correspondent or as editor, with many of the daily papers of his native city.

**CROLY, JENNIE CUNNINGHAM**, better known as "Jennie June," born in Leicestershire, England, whence she came in early life to the United States. She married David Croly in 1856, and has since been continuously engaged as correspondent of many of the principal daily and weekly papers of New York, New Orleans and Baltimore. The first two women's congresses (1856 and 1869) were called by Mrs. Croly; and in 1868 she inaugurated the women's society known as the Sorosis. She is now editor of the "Home Maker," a monthly magazine published in New York.

**CROMDALE**, a place in Elginshire, on the right bank of the Spey, 5 miles northeast of Grantown. Here, May 1, 1690, 800 Jacobite Highlanders were surprised and routed by a body of King William's dragoons.

**CROMER**, a town and watering-place of England, in the county of Norfolk, 21 miles north of Norwich. The inhabitants are mostly engaged in fishing. Cromer Bay is called the Devil's Throat, on account of the danger of its navigation.

**CROMWELL, RICHARD**, a son of Oliver Cromwell, Lord Protector of England, born at Huntingdon, Oct. 4, 1626, died in 1712. When Oliver attained the dignity of lord protector, he called his son from the obscurity of a country-house to have him elected for the counties of Monmouth and Southampton, appointed him first lord of trade and navigation, and made him chancellor of Oxford. In none of these capacities did Richard Cromwell exhibit any aptitude; and his failure as protector, to which high office he succeeded, on the death of his father, was still more conspicuous. The result was his demission a little more than seven months after he had assumed the scepter of the commonwealth. He retired to Hampton Court, whence Parliamentary stinginess and pressing creditors soon drove him to the Continent, where he resided for a considerable time. At length, returning to England, he had a house provided for him at Cheshunt, near London, where he resided in strict privacy until his death.

**CRONHOLM, ABRAHAM PETER** (1809-79), Swedish historian. From 1849 to 1855 he was professor of history at Lund. After his retirement from that post he devoted himself exclusively to literature. He published a large number of valuable historical works.

**CROOK**, in music, a short tube, which may be inserted into various wind-instruments, so as to lower their fundamental tone or key. The term is also applied to the circular tube which fits into the end of the instrument next the mouth-piece.

**CROOK, GEORGE**, an American soldier, born near Dayton, Ohio, 1828. A graduate of the United States Military Academy, he entered upon active service with the 4th Infantry in California in 1852. From 1852 to 1861 he participated in various expeditions against the Indians, in one of which he was wounded by an arrow. At the breaking out of the civil war he became colonel of the 36th Ohio infantry, and subsequently commanded the 8d pro-



visional brigade in the West Virginia campaigns. In the summer of 1862 he was engaged in the Virginia and Maryland campaigns, and was brevetted lieutenant-colonel, United States Army. July 1, 1863, he was transferred to the 2d cavalry division, and participated in the battles of Tullahoma and Chickamauga. In February, 1864, he was assigned to the command of the Kanawha district in Western Virginia, and in the latter part of that year took part in Sheridan's celebrated Shenandoah campaign. In March, 1865, he was brevetted major-general, and was in command of the cavalry of the army of the Potomac until the close of the war. He was mustered out of the volunteer service in January, 1866, and shortly afterwards was commissioned lieutenant-colonel of the 23d infantry, United States army, and sent to Idaho to settle the Indian disturbances. During the six years which followed, Gen. Crook was actively engaged in Indian campaigns. In 1872 he went to Arizona, and compelled the Pi-Utes and Apaches to submit, and in 1875 he subdued the Sioux and Cheyenne Indians in the Northwest. In 1882 he drove the Mormons and squatters from the Indian lands upon which they had encroached, and in the following year forced the Chiricahuas to cease their depredations. In this latter campaign Gen. Crook marched over 200 miles, made over 400 hostile prisoners, and captured all their horses and plunder. He introduced many reforms in the management of the Indians, the principal one being to compel the contractors to pay the Indians in cash for supplies instead of store orders. Under his vigorous management the tribes speedily became self-supporting. He died in 1890.

**CROOKED ISLAND**, one of the Bahamas, valuable chiefly for its salt, of which it produces about 12,000 bushels annually. Its area is about 160 sq. miles.

**CROOKES, WILLIAM**, an English chemist and physicist, born in 1832. In 1855 he became an instructor in the Science College, Chester. In 1859 he founded the "Chemical News," of which he is still editor. He has since made numerous important discoveries in chemistry, and has written various works on the subject.

**CROOKS, GEORGE RICHARD**, an American author, born in 1822. In 1841 he became a minister in the Methodist Episcopal Church, and was sent as a missionary to Illinois. In 1842 he was appointed a professor in Dickinson College, and in 1843 became principal of the collegiate grammar school. In 1848 he returned to the ministry, and was pastor successively in Philadelphia, Wilmington, New York and Brooklyn. In 1860 he became editor of "The Methodist." He has published works on various subjects.

**CROOKSTON**, a flourishing town of Minnesota, county-seat of Polk county, situated on Red Lake River, about 65 miles north of Glyndon, in the fertile Red River Valley of the North.

**CROP**, or **OUR-CROP**, the edge of a stratum where it rises to the surface, or, as miners say, comes out to the day.

**CROPKEDY BRIDGE**, a bridge which gives name to a battle between the royalists under Charles I. and the parliamentarians under Waller, June 29, 1644.

**CROP REPORTS**, a term technically applied to reports made in advance of the harvesting of agricultural products with regard to the probable yield of such products at the time of such harvest. They are based upon early and accredited information by capable observers as to the amount of acreage planted or sown; the condition of the growth and the "friendliness" of the season at any given date;

the present or prospective prevalence of noxious insects, or of blight in any form. Such information is collated with that of previous years under similar conditions (and whose harvests have become a matter of record), and a resultant opinion is thus formed as to the probabilities of the ensuing harvest. These reports made either by officers appointed by State or national governments, or by enterprising newspaper publishers, or agents of commercial corporations and business houses, largely affect the contract prices of all farm products for future delivery.

**CROPSEY, JASPER FRANCIS**, an American landscape painter, born in Rossville, N. Y., 1823. He first devoted himself to architecture, but developing unusual genius as a landscape painter, he received instruction from Edward Maury, and in 1847 visited England, France, Switzerland and Italy, spending three years in the latter place, and producing, among other paintings, *The Pontine Marshes* (1850). In 1855 he again went abroad, and resided seven years in London, his productions being exhibited at the Royal Academy and at the International Exhibition of 1862. He returned to America in 1863, and established a studio in New York. In 1885 he removed his studio to Hastings-upon-Hudson. He was elected a member of the National Academy in 1881.

**CROSBY, HOWARD** (1826-91), an eminent American Presbyterian clergyman, born in New York city, Feb. 27, 1826, died there March 29, 1891. He graduated at the University of the city of New York in 1844, and became professor of Greek in that institution in 1851, and a professor at Rutgers College, N. Y., in 1859. In 1861 he was ordained a minister, and became pastor of the First Presbyterian church of New Brunswick. In 1863 he was called to the pastorate of the Fourth Avenue Presbyterian church in New York city, which position he retained until his death. In 1859 Harvard College conferred the degree of D. D. upon him, and in 1871 Columbia College gave him that of LL. D. From 1870 to 1881 he was chancellor of the New York University. He was one of the founders and chief promoters of the Society for the Prevention of Crime, and from its organization in 1877 was its president. He was a delegate to the first Presbyterian General Council at Edinburgh in 1877. He wrote numerous books, the most noteworthy being: *Lands of the Moslem* (1851); *Edipus Tyrannus* of Sophocles (1851); *Life of Jesus* (1870); *Bible Companion* (1870); *The Humanity of Christ* (1880); and *Commentary on the New Testament* (1885). He was a member of the American section of the New Testament Revision Committee.

**CROSBY, PIERCE**, an American naval officer, born in Delaware county, Pa., in 1823. He became a midshipman in the navy at the age of 15. From 1842 to 1860 he served on various vessels, having in the mean time been commissioned lieutenant. At the opening of the civil war he was assigned to duty in Chesapeake Bay, and rendered efficient service in keeping communications open between Annapolis and Havre de Grace. He took a prominent part in the battle of Big Bethel, and in the attack on Forts Hatteras and Clark. He was given command of the gun-boat *Pinola* during the winter of 1861-62, and in addition to other engagements participated in the capture of New Orleans, and in the passage of the batteries at Vicksburg. He became fleet captain of the North Atlantic squadron in 1862, having been promoted to commander in September of that year. He subsequently commanded the *Florida*, the *Keystone State*, the *Metacombel*, and *Shamokin*. While in command of the *Metacombel* he removed with drag-nets a large number of torpedoes

from the approaches to Mobile. He was promoted to a captaincy in 1868, to commodore in 1874, and rear-admiral in 1882. After 48 years of active service he was retired in 1888.

CROSIER, or CROZIER, archbishop's staff. See *Britannica*, Vol. VI, pp. 463, 614.

CROSS, MARY ANN (1820-80), "George Eliot," *née* Evans, an English novelist. She commenced contributing to various reviews at an early age, but her first novel, *Scenes of Clerical Life*, appeared in 1857. Among her popular books are: *A Man of Letters*; *The Mill on the Floss*; *Silas Marner*; *Romola*; *Felix Holt* and *Middlemarch*, besides a volume of poems.

CROSS, SIR RICHARD ASSHETON, a British statesman, born in 1823. He was admitted to the bar in 1849, and from 1857 to 1862 was a member of Parliament. In 1868 he was again in Parliament, and was re-elected in 1874. The same year he became home secretary and privy counselor, and in 1876 was chosen a bencher of the Inner Temple. In 1885 he became again home secretary, and was raised to the peerage and appointed secretary for India in 1886. The latter position he holds at the present writing, 1891.

CROSS-BILL, a bill of exchange or promissory note given in consideration of another bill or note.

CROSS-BOW, a weapon largely used in war and sport in mediæval times. See *ARBALEST*.

CROSS-BUNS, a small cake specially prepared for Good Friday. These buns were appropriately marked with a cross, hence the name. The origin of the practice is obscure; most probably it is a relic of some heathen observance, to which the early church gave a Christian significance.

CROSSE, ANDREW, electrician, born at Fyne Court, Somersetshire, June 17, 1784, died July 6, 1855. His principal researches in science were as to the artificial formation of minerals by processes of electrical deposition, and the application of electricity as a means of improving wines, cider, etc. In 1837 he announced that, under certain circumstances, organisms (of the genus *Acarus*) appeared in solutions of inorganic substances; a discovery which attracted much attention, but which exposed him to the ridicule of opponents.

CROSS-EXAMINATION, in law, the examination or interrogation of a witness of the adverse party.

CROSS-KEYS, a village of Rockingham county, Va., where a battle took place June 8, 1862, between the armies under Generals Fremont and Jackson.

CROSSLEY, SIR FRANCIS (1817-72), an English ~~abolitionist~~ and philanthropist. Among his benefactions to Halifax, his native town, were a public park at a cost of £40,000, almshouses and orphan homes, besides large donations to the London Missionary Society and to the Congregationalists. A baronetcy was conferred on him in 1863, and from 1852 to 1872 he represented Halifax in the Liberal interests.

CROSSRAGUEL, a ruined abbey in Ayrshire, dating from 1244. A notable "disputation" took place in 1562 between John Knox and the abbot, Quenton Kennedy; and in 1570 the commendator was tortured by fire by the Earl of Cassilis, to force him to resign certain lands.

CROSS, SOUTHERN, the most conspicuous constellation of the Southern hemisphere. It consists of four bright stars in the shape of a cross. The two brilliant stars which mark the summit and foot of the cross have nearly the same right ascension. The constellation, therefore, is almost perpendicular when passing the meridian, and these two stars act as pointers to the Antarctic pole.

CROTALARIA, a genus of plants of the natural order *Leguminosæ*, sub-order *Papilionaceæ*, contain-

ing several hundred species, all natives of warm climates, but cultivated in hot-houses. Many of them have long, straight, slender stems and branches, and some yield valuable fiber, particularly *C. juncea*, the Sunn hemp of India, the fiber of which is now an important article of commerce. *C. sagittalis*, or rattle-box, is a common species of the eastern United States.

CROTALIDÆ, family of snakes. See *Britannica*, Vol. XXII, pp. 193, 198.

CROTON, a genus of plants of the natural order *Euphorbiaceæ*. There are about 500 known species, natives of warm and tropical climates. The most important is the *C. tiglium*, a native of the East Indies, which possesses active purgative properties. Croton oil is extracted from the seeds of this species. The balsamic sap of some South American species is dried and used as incense.

CROTON RIVER rises in Dutchess county, New York, flows in a southerly direction through the counties of Putnam and Westchester, and, about 35 miles above New York city, enters the Hudson. This river is the chief source of the water-supply for the city of New York, and is about 50 miles long.

CROTOPHAGA, a genus of birds of the sub-family *Crotophaginæ*. The best-known species are *C. ani* and *C. sulcirostris*, natives of the United States. They are gregarious in habit, and nest in bushes.

CROW. See *Britannica*, Vol. VI, pp. 617-19.

CROWBERRY, or BROOM-CROWBERRY (*Empetrum nigrum*), a small procumbent shrub, of the natural order *Empetraceæ*, common on heaths in Scotland and the North of England, and found in the northern part of the United States.

CROW-BLACKBIRD. See under GRACKLE, *Britannica*, Vol. XI, pp. 26-27.

CROWE, MRS. CATHERINE, *née* Stevens (1800-76), an English authoress. Her mind was morbid and despondent, and at one time she had a violent but brief attack of insanity. She wrote supernatural stories, tragedies, juvenile books, and novels.

CROWE, JOSEPH ARCHER, an English art writer, born in 1825. He was a special correspondent in the Crimean war, the Indian mutiny, and the Franco-Austrian war; and in 1857-59 was director of the School of Art at Bombay. In 1860 he was appointed British consul-general at Leipzig, and afterwards at Düsseldorf. In 1882 he was made commercial attaché at Paris.

CROWN, in architecture, a species of spire or lantern, formed by converging flying buttresses.

CROWN DEBTS. It is a prerogative of the crown to take precedence of all other creditors, and in England, to recover its debts by a summary process called *extent*. The rule in Scotland, however, was limited to movable or personal property, and the crown has no privilege over a subject in a competition for heritage.

CROWN LANDS, the demesne lands of the English crown. They are now contracted within narrow limits, having been almost entirely granted away to subjects. The superintendence of such property as still belongs to the crown is now vested in commissioners appointed for the purpose, called the commissioners of woods, forests and land revenues.

CROWN PIECE, an English silver coin of the value of five shillings, introduced by Henry VIII. It has a standard weight of 436.56 grains. The name crown is also used as the translation of the French *écu*, which varied in value from 6 francs to 3 francs.

CROWN POINT, a post-village of New York, on Lake Champlain, near the site of a British fort of



the same name surprised and captured by Ethan Allen in 1775.

**GROWN POINT**, a railroad village and county-seat of Lake county, Ind. It is 41 miles southwest of Chicago.

**CROWN-WORK**, in fortification, is formed to strengthen a weak front, or to occupy ground which might facilitate the enemy's operations. It consists of two faces inclined to each other at an angle, with a bastion in the middle, and half bastions at the two ends; and it is connected with the main body of the work by two long sides.

**CROW-STONE**, the top stone of the gable end of a building.

**CROWS**. See **INDIANS, AMERICAN**, in these Revisions and Additions.

**CROZET ISLANDS**, a volcanic group to the south of the Indian Ocean, which lies between Kerguelen on the east and Prince Edward Islands on the west, about midway between Patagonia and New Zealand.

**CRUCIAN** (*Cyprinus carassius*), a fish of the same genus with the carp, from which it differs in the want of barbules at the mouth, and in the almost square tail. It inhabits lakes, ponds, and slowly-flowing rivers, in the north of Europe and Asia. In Sweden it is called *Karussa*.

**CRUCIBLES**, vessels made of materials capable of being exposed to high temperatures without alteration, and used for fusing substances together, such as the materials for glass-making or metallic ores, with various fluxes to obtain the several metals they yield. Crucibles are generally made of fire-clay, porcelain, graphite, iron, platinum, and, for some special operations, of silver.

**CRUISER**, a small war vessel, employed chiefly in watching an enemy by sailing about in a suspected latitude.

**CRUCIFERÆ**, an important natural order of dicotyledonous plants, of about 1,500 known species, found in all countries. The flowers have a calyx of four sepals, which fall off after flowering; and a corolla of four petals, which are placed in the form of a cross, whence the name. The order includes many important vegetables, as the turnip, cabbage, radish, mustard, cress, etc. It also includes many fragrant flowering and ornamental plants, as the sweet alyssum, *فلسفین*, rocket, etc. The order is equivalent to the Linnean class *Tetracynum*.

**CRUELTY TO ANIMALS, AMERICAN SOCIETY FOR THE PREVENTION OF**, an organization founded in New York city in 1866, by Henry Berg, Elbridge T. Gerry, Gov. John T. Hoffman, Judge James T. Brady, Gen. John A. Dix, Judge Charles P. Daly, Francis B. Cutting, John Van Buren, Hamilton Fish, Samuel B. Ruggles, James J. Roosevelt, James W. Gerard, and other distinguished citizens, and incorporated by special legislative act in 1867. See **ANIMALS, PREVENTION OF CRUELTY TO**, and **BERG, HENRY**, in these Revisions and Additions.

**CRUGER, JOHN**, colonial mayor of New York, born in New York city in 1710, died in 1792. When quite young he embarked in commercial pursuits, and became one of the principal shipping merchants of New York. He was elected to the common council in 1754, and mayor from 1756 to 1765. In 1769 he represented the city in the general assembly and was a member of the committee which prepared the memorial to the home government relative to the dangers of "taxation without representation." In 1769 he again represented the city in the general assembly, and was chosen speaker. He was one of the organizers of the New York chamber of commerce, and was its first president.

**CRUIKSHANK, GEORGE** (1792-1878), an English artist. His first works of note were a series of po-

litical caricatures, entitled *Life in London*. He later made numerous other designs on various subjects. The number of his works is so large that it has never been computed. Among some of his best plates are those illustrative of *John Gilpin*, *Tom Thumb*, *Sketches by Boz*, *Oliver Twist*, *Jack Sheppard*, *The Tower of London*, and *Windsor Castle*. See *Britannica*, Vol. V, p. 105.

**CRUIVES AND ZAIRES**, contrivances erected upon the rivers in Scotland for the purpose of catching salmon. They are of great antiquity, and consist of a kind of hedge formed by stakes driven into the ground, the interstices being filled with brush.

**CRUMMELL, ALEXANDER**, an American clergyman, born in 1820. He was the grandson of a king of Timanee, near Sierra Leone. He was ordained a deacon in the P. E. church, and later a presbyter. For several years he was a missionary in Liberia. He has since been rector of St. Luke's church, Washington, D. C.

**CRUSE, CHRISTIAN FREDERIC**, an American clergyman and educator, born in Philadelphia, Pa., in 1794, died in New York, Oct. 5, 1864. He graduated at the University of Pennsylvania in 1817, and was ordained as a Protestant Episcopal minister in 1822. He made a special study of ancient languages, and from 1831 to 1833, was assistant professor in the University of Pennsylvania. He was also at one time professor in St. Paul's College, Minn., and in Flushing Institute on Long Island. From 1847 to 1853 he was rector of Trinity church, Fishkill, N. Y., after which he removed to New York, becoming librarian of the general theological seminary. He translated several important works, the more noteworthy being the *Ecclesiastical History of Eusebius*, which is considered the standard English translation.

**CRUSHERS** or **BRUISERS**, implements used for reducing to small fragments, corn, beans, linseed, oil-cake, and other similar hard food for live-stock, in order that it may be more thoroughly subjected to the action of the gastric juice, and that no part of it may pass through the animal undigested.

**CRUYS, CORNELIUS** (1657-1727), the founder of Russian maritime power, born June 14, 1657. He was a rear-admiral in the Dutch service, when *Czar Peter the Great*, noticing his abilities, persuaded him to go to Russia. There, in 1698, he was received with great splendor, and soon appointed vice-admiral. His services to Russia were of various kinds; to him it owed its first dock-yards, canals, and charts, the organization of its navy, and its victories over Sweden and Turkey in 1708-1710. He died in 1727, possessor of an imperial domain in Kexholm, and owner of the island Birken in Finland. It is in memory of him that the white flag with the blue cross still floats from the Russian men-of-war.

**CRYSTAL FALLS**, in Cascade Creek, Montana, a series of cascades which, together, measure 129 feet. They are one mile from the mouth of the creek where it flows into the Yellowstone River.

**CRYSTALLINE ROCKS**, a name given to all rocks having a crystalline structure. The crystalline texture may either be original or superinduced. Thus, most crystalline rocks, such as certain calcareous masses, owe their origin to chemical precipitation from water, while others, again, such as lavas, have been consolidated from a state of igneous fusion. There is another large class of crystalline rocks, the crystalline granules, some of which present a remarkable foliated character—that is, they are arranged in more or less parallel layers. This peculiar structure appears to have been

superinduced—the original rocks having been either fragmental or crystalline or both, and the result of great heat and pressure.

**CRYSTALLOMANCY**, a mode of divination by means of transparent bodies, at one time very popular. A precious stone, crystal globe, or other transparent object, was employed; but a beryl was deemed most effective. In using it the operator first muttered over it certain formulas of prayer, and then gave it into the hands of a youth or virgin, who beheld in it the information required.

**CSABA**, a town of Hungary, seven miles southwest of Bekes. It has an extensive trade in corn, cattle, fruit, wine, hemp and flax. Population, 30,000.

**CSAT** or **CSATH**, a town of Hungary, in the county of Borsod, 13 miles from Miskolez. Population, 5,000.

**CSANAD**, a town of Eastern Hungary, capital of the county, 44 miles north of Temesvar, on the Maros. The county has an area of 699 square miles. Population, 95,000.

**CSONGRAD**, a town of Hungary, in the county of the same name, at the confluence of the Theiss and the Koros, 70 miles southeast of Pesth. Population, 17,500.

**CTENOID FISHES**, an order of fishes, characterized by ctenoid scales. The name is from the Greek *kteis*, a comb. The scales are horny or bony and unnamed. Living ctenoid fishes are numerous, fossil ones comparatively few. Perches, flounders, and turbot may be mentioned as examples.

**CUAUHEMOTZIN** (Pronounced kwau-tay-motseen), 13th and last Mexican king, born in 1495, ascended the Mexican throne in 1521, and surrendered with the City of Mexico to Cortez in August of the same year. He was subjected to torture in a vain attempt to induce him to disclose the hiding place of his treasures, and, after being kept in confinement three years, was executed. An elaborate monument, surmounted by a bronze statue of Cuauhemotzin was erected to his memory in the City of Mexico in 1887.

**CUBA**, one of the West India Islands, and a colony of Spain. For its history and productions, see Vol. VI, p. 678; Vol. XXII, p. 298; Vol. XXIV, p. 510; Vol. XXII, p. 142. An English consular report stated that in August, 1889, the public debt amounted to over \$150,000,000, which absorbed about \$9,000,000 to meet the annual interest. The same authority estimated the annual income at \$80,000,000. The estimated budget for 1890-91 placed the receipts for the year at 25,815,376 pesos, and the expenditures 25,446,807 pesos, of which 10,447,267 pesos would be required for the debt, 6,229,427 pesos for the ministry of war, and 4,237,862 pesos for the ministry of the interior. Sugar is the chief export. It was estimated that in 1888, 666,719 tons were produced. During the last two years the molasses production reached 153,015 tons, and 157,791 tons. The yearly produce of tobacco in Cuba is about 300,000 bales. In 1887 nearly 220,000,000 of cigars were also exported from Havana. The total value of the principal articles of export from Havana for 1888 was about \$29,000,000, and the imports about \$12,000,000. In Cuba there were, in 1891, 2,810 miles of telegraph and about 1,000 miles of railway. In 1885 a loan of \$40,000,000 was authorized to complete the Cuban railroads.

**CUBAGUA**, a small island of Venezuela, 30 miles north of Caracas, in the Caribbean Sea, between Margarita and the mainland.

**CUCURBITACEÆ**, an important order of corollifloral dicotyledons, of which the 500 species are mostly herbaceous climbers, inhabiting the warmer regions of the globe. The young shoots and leaves of many species are used as pot-herbs, and the per-

sistent rhizomes or roots of others are sometimes esteemed on account of their store of starch. The central importance of the order is due to the characteristic fruit, which is technically known as a *pepo*, but which may be regarded as a large and many-seeded berry, with its more or less succulent pulp protected by a hardened wall. The many specific and varietal forms are known as cucumbers, melons, gourds, pumpkins, squashes, vegetable-marrows, bottle-gourds, etc.

**CUCKOO**. See *Britannica*, Vol. VI, pp. 685-87.

**CUDDY**, the name first applied in East India trading ships to a cabin under the poop, where the men messed and slept. The same name was afterwards given to the only cabin in very small vessels, and sometimes to the cooking-room.

**CUDLIP**, **ANNIE THOMAS**, an English novelist, born in 1838. Among her most popular books are: *Sir Victor's Choice*, *Barry O'Byane*, and *Denis Donne*. Her stories are principally society novels.

**CUDWEED**, a popular name of many species of plants belonging to the natural order *Compositæ*, sub-order *Corymbifera*, whose stems and leaves are more or less covered with a whitish cottony down. They may be kept a long time without undergoing much apparent change, and may therefore be reckoned among everlasting flowers.

**GUERO**, a city of Texas, county-seat of DeWitt county, situated on the Guadalupe River, 80 miles east of San Antonio. It contains a number of large cotton-gins and a variety of manufactories.

**CUEVA DE VERA**, a town of Spain, 42 miles northeast of Almeria, situated on the Almanzor. It has manufactories of hardware, earthenware, wine and oil. Population, 7,500.

**CUFFEE**, **PAUL**, an American negro philanthropist, born of free parents at Westport, Mass., 1759, died Sept. 7, 1818. When but 15 years old his father died, and Paul was thrown upon his own resources. He first learned to read and write, and then applied himself to the study of navigation. At 16 he shipped on board a whaler, but was captured by a British cruiser, and imprisoned in New York three months. During the last two years of the Revolutionary war he worked on a farm in Massachusetts. Through his efforts the right of suffrage was granted to all persons of African descent in Massachusetts. In 1781 he became the owner of an open boat, and with his earnings was soon able to secure a schooner, which he manned with members of his own race. The schooner was soon exchanged for a brig, and the latter for a ship, with which he made voyages to Russia, England, and the West Indies. In a few years he amassed considerable wealth, which he devoted to the amelioration of the condition of his race. He built a school-house at Westport, maintained a teacher at his own expense, and opened it for the free instruction of his neighbors. He became closely identified with the efforts then being made by several philanthropists to found a colony of free negroes in Africa, and in 1811 visited Sierra Leone, where he founded the "Friendly Society of Sierra Leone." From there he sailed to England. On his return to America he collected a company of 38 negroes, whom he carried to Sierra Leone in 1815, and founded the first colony of free blacks. In his early life he had joined the Society of Friends, and subsequently became one of their ministers. In accordance with their principles, while engaged in commercial pursuits, he never dealt in either slaves or rum. While in the midst of his colonization schemes, he was seized with a fatal illness, which terminated in his death, Sept. 7, 1818.

**CUISSARTS**, small strips of iron plate laid horizontally over one another round the thigh, and



riveted together; in ancient times they were worn by troopers.

**CUIRASS**, originally a jerkin, or garment of leather for soldiers, so thick and strong as to be pistol-proof. The name was afterwards applied to a portion of armor made of metal, consisting of a back-plate and breast-plate hooked or buckled together.

**CULENBORG**, or **KULLENBURG**, a fortified town of the Netherlands, situated on the river Leck, 10 miles northwest of Thiel. It has manufactories of arms, silk fabrics and twist. Population, 6,200.

**CULIACAN**, a town of Mexico, 90 miles southeast of Cuialoa, in a fertile tract, on the river Culiacan. It is a depot for goods passing between Guaymas and Mazatlan. Population, 10,000.

**CULILAWAN BARK**, also called clove bark, a valuable aromatic, the product of the *Cinnamomum Culilawan*, a tree of the same genus as the cinnamon-tree, growing in the Molucca Islands. Its use is commended in cases of indigestion, diarrhœa, etc.

**CULLEN**, a fishing town of Banffshire, on the Moray Firth, 67 miles northwest of Aberdeen by railway. It has a cruciform parish church, founded by Robert Bruce, whose second queen died here, and which in 1543 was made collegiate. Cullen has been a royal burgh since about 1200, and unites with Elgin and five other places to return one member to Parliament. Population, 2,000.

**CULLEN, PAUL** (1803-78), an Irish prelate and cardinal. At one time he was professor of Hebrew in the College of the Propaganda, and later became rector of the Irish College at Rome. In 1849 he was appointed primate of all Ireland. In 1852 he was transferred from Armagh to the see of Dublin, and was made delegate apostolic for life. In 1866 he became a cardinal priest.

**CULLUM, GEORGE W.**, an American soldier, born in New York in 1809, graduated at the United States Military Academy in 1833, entered the engineer corps, rising to the rank of colonel. Until the outbreak of the civil war he was chiefly engaged in the construction of fortifications and public works at New London, Boston harbor, New York city, Charleston and New Bedford. In 1861 he was appointed aid-de-camp to Lieutenant-Gen. Winfield Scott, and later was commissioned brigadier-general of volunteers. He was chief of staff to Gen. Halleck, chief of engineers at the siege of Corinth, and projected many engineering undertakings. He was superintendent of the United States Military Academy at West Point from 1864 to 1866. From 1867 to 1874 he was a member of the board of engineers for improving the defense of the territory of the United States. In January, 1874, he retired from active service, since which time he has devoted himself to literary, scientific and military studies. He is vice-president of the American Geographical Association, and has been president of the Geographical Library Society for several years. He has published several military memoirs and historical sketches.

**CULMINATION**, an astronomical term, signifying the passage of a star across the meridian. The star is then at the highest point (*culmen*) of its course; hence the name. The sun culminates at midday.

**CULPA**, a fault which leads to legal liability for the immediate consequences. It may arise under a contract, especially where many of the obligations of the parties are left to implication—for example, in the contract of carriage of passengers, or from the mere relative position of parties, as where a member of the public, or a neighbor, is injured by the negligent use of property.

**CULPEPER**, or **COLEPEPER**, **THOMAS, LORD**, a colonial governor of Virginia, born in England. In 1673 King Charles II granted to him and others of the royal favorites the territory of Virginia for a period of 31 years, and in 1675 Lord Culpeper was proclaimed governor of Virginia for life. He removed to the colony in 1680, remaining three years, during which time an act of indemnity was passed for offenses committed during the rebellion under Governor Berkeley. On his return to England he was charged with having violated his orders, and was arrested and his commission as governor declared forfeited. Through bribery and extortion he had greatly enriched himself, his estates, descending through his daughter, Catherine, to Lord Fairfax. He died in England in 1719.

**CULTIVATED PLANTS**. Like the mineral and animal world, the progress in the vegetable kingdom is measured by its utilization by man. We find positive evidence of the existence of agriculture long before written records; yet researches of times even more ancient contain no traces of cultivated plants. Since the rise of modern botany our knowledge of species at least possibly useful has been greatly extended; but the majority of species of primary nutritive importance to man at present are among those which have been in cultivation for more than 2,000 years. The plants in cultivation for the past 2,000 years are of a quality more delicate than necessary.

**CULTRIHOSTRES**, a tribe of birds of the order *Grallatores*, distinguished by a long, thick, stout and generally pointed and trenchant bill, and including cranes, herons, storks, etc.

**CULM**, in botany, the peculiar cylindrical hollow and jointed stem of grasses.

**CUMMINS, GEORGE DAVID**, an American bishop, born in Delaware in 1822, died in 1876. He graduated at Dickinson College in 1841, and was at first licensed as a Methodist minister, but subsequently entered the Protestant Episcopal church, and after officiating as rector in Baltimore, Norfolk, Richmond and Chicago was ordained assistant bishop of Kentucky in 1866. In 1873 he abandoned his office, and organized a new sect called "The Reformed Episcopal Church." He became the first bishop of the new denomination.

**CULVERIN**, one of the earlier forms of cannon, of great length, generally an 18-pounder, weighing 50 hundred weight, the *demí-culverin* being a nine-pounder weighing 30 hundred weight.

**CULVERT**, the name given to an arched channel of masonry for the conveyance of water underground.

**CUMBERLAND**, a city of Maryland, and county-seat of Alleghany county, located on the north bank of the Potomac River, at the mouth of Wells Creek, at the western terminus of the Chesapeake and Ohio canal, and at the southeastern terminus of the Pittsburgh, Washington and Baltimore Railroad. A bridge crosses the Potomac River at this point. The city contains five public schools, and one academy. Its principal public buildings are the courthouse, city hall and jail. Bituminous coal is mined in the vicinity, and large quantities are shipped from this point. It is the third city in the State in population, and has extensive manufacturing interests. Population in 1880, 10,963; in 1890, 10,030. See Britannica, Vol. VI, p. 700.

**CUMBERLAND GAP**, a narrow mountain pass on the line between Kentucky, Tennessee and Virginia, which was considered an important point during the civil war. The Confederates held it till June 18, 1862, when the national army took possession. It passed successively into the hands of the opposing armies, General Burnside's troops being

the last to hold it. The gap is 500 feet deep, and in some places wide enough for only one road.

CUMBERLAND ISLAND, a peninsula of Baffin Land, extending into Davis Strait.

CUMBERLAND PRESBYTERIAN CHURCH. See RELIGIOUS DENOMINATIONS in the UNITED STATES, in these Revisions and Additions.

CUMBERLAND RIVER, a branch of the Ohio. It rises in the Cumberland Mountains, flows westward, enters Tennessee, returns to Kentucky, flows north and enters the Ohio. Its length is about 650 miles, and at certain favorable seasons it is navigable for 600 miles.

CUMBRE, LA (Sp., top or height), one of the principal passes across the Andes, on the high road between Santiago, in Chili, and Mendoza, in the Argentine Republic. The altitude of its crest is 12,454 feet.

CUMBRAIN MOUNTAINS, a great knot of mountains nearly 50 miles in length and breadth, in the northwest of England, occupying part of Cumberland, Westmoreland and Lancashire. There are 25 mountain tops upwards of 1,500 feet high.

CUMIANA, a town of Italy, in the province of Turin, seven miles north of Pinerolo, near the right bank of the Cisola. Population, about 6,000.

CUMMING, JOHN (1810-81), a British divine. In 1833 he was ordained minister of the Scotch Church in London. Among his most popular works are *Apocalyptic Sketches; God in History and in Science; The Destiny of Nations; The Sounding of the Last Trumpet; and The Fall of Babylon Foreshadowed*.

CUNAXA, a place in Babylonia, on the eastern bank of the Euphrates, about 45 miles north of Babylon, noted for the battle fought there (B. C. 401) between Cyrus the Younger and his brother Artaxerxes Mnemon, in which the former was killed. See Britannica, Vol. VI, p. 753.

CUNNINGHAM, ALEXANDER, an English archaeologist, born in 1814. He received a military education, and in 1831 was second-lieutenant of engineers; in 1834, aid-de-camp to the governor-general of India; in 1839, was on a special mission to Cashmere; and in 1840, became engineer to the king of Oudh. In 1858 he was chief engineer of the North-west Provinces, and in 1870 became surveyor-general of Indian archaeology. He has published numerous articles on archaeological topics.

CUNNINGHAMIA, a genus of trees of the natural order *Coniferae*, nearly allied in botanical characters to the pines and firs, but in foliage resembling the *Arancarias*.

CUP, DIVINATION BY, a mode of foretelling events, practiced by the ancient Egyptians. One of the Eastern methods consisted in throwing small pieces of gold or silver leaf into a cup of water, in which also were placed precious stones, with certain characters engraved upon them. The infernal powers were then invoked, and were believed to return answer, either in an intelligible voice, by signs on the surface of the water, or by a representation in the cup of the person concerning whom inquiry was made.

CUPAR-ANGUS, a town of Scotland, in the counties of Perth and Forfar, situated on the left bank of the Isla. It has extensive linen manufactories and considerable traffic in timber. Population, 2,150.

CUPULE, in botany, a sort of cup formed by a number of cohering bracts, and surrounding the fruit or the base of the fruit in certain plants; as the oak, in which it is the cup of the acorn, and the hazel, in which it is the husk of the nut.

CUPULIFERÆ, a natural order of exogenous plants, consisting of trees and shrubs, natives of temperate climates. The leaves are alternate and

furnished with stipules; the male flowers, and sometimes the female flowers, are disposed in catkins; the fruit is a one-celled nut, and the seed is usually solitary. This order contains many of the most important trees of Europe and America, including all the different species of oak, beech, chestnut, hazel, etc.

CURACOA ORANGES, small oranges which have fallen from the tree long before maturity. They have properties similar to those of orange-peel, but are more bitter and acrid.

CURARI. OURARI, WOORALI, or WOORARA, a celebrated poison, consisting of the aqueous extract of *Strychnos torsera*, and various other species of the same genus used by the South American Indians for poisoning their arrows. The poison when introduced into the blood acts on the nervous system, and produces paralysis, with convulsive movements, and death ensues. Like snake poison, it is comparatively inert when taken into the stomach.

CURCI, CARLO MARIA, an Italian theologian, born in 1810. He has preached in several cities in Italy, and founded and edited "La Civiltà Cattolica." He has written extensively on religious topics, and has published an Italian translation of the New Testament.

CURCULIO. See under WEEVIL, Britannica, Vol. XXIV, p. 277. See also, Vol. XIII, p. 149.

CURCUMA, a genus of plants of the natural order *Scitamineæ*, having the tube of the corolla gradually enlarged upwards, and the limb two-lipped, each lip three-parted. *Curcuma longa* is widely cultivated in Southern Asia, its rhizomes being the source of Turmeric. *Curcuma zedoaria* yields a tonic medicine, and is also used as food. *Curcuma amada* is the mango ginger of Bengal.

CURLEW. See Britannica, Vol. VI, pp. 711-12.

CURRACH, COURACH, or CORACLE, a name applied in the British Islands to a canoe or boat made of a slender frame of wood, covered with skins. Skiffs of this sort, as well as canoes hollowed out of the trunks of trees, were in use among the Britons in the earliest times of which we have record. The currach still continues to be used on the Severn, and on many parts of the Irish coast, especially on the shores of Clare and Donegal.

CURRENTS. See Britannica, Vol. VI, p. 715.

CURRENT WINE, a wine made of the juice of red, black or white currants, to which is added about one pint of water for every four pints of berries employed. About a pound and a half of sugar is afterwards added to each pint of the liquor, a little spirits being generally also added before it is set aside to ferment. Fermentation requires several weeks, and the wine is not fit for use for at least some months afterwards.

CURRENT RIVER, a stream of Missouri and Arkansas, 250 miles in length. It rises in Texas county, Mo., flows southeast into Arkansas, where it reaches the Black River. Its waters are very clear and abound in fish.

CURRENTS, OCEAN. See Britannica, Vol. X, p. 283; Vol. XII, p. 468; Vol. XXIV, p. 416.

CURRY-COMB, a kind of scraper used for grooming horses. It consists of a number of iron plates notched on one edge to form rough teeth. These plates are fastened in parallel lines to an iron back, to which a handle is attached, and the horse is curried by scrubbing with the teeth.

CURRY, DANIEL, a distinguished Methodist clergyman and author, born near Peekskill, N. Y., in 1809, died in 1887. He graduated at Wesleyan College in 1837. Subsequently he was principal of Troy Conference Seminary and a professor in the female college at Macon, Ga. He entered the



Methodist ministry in 1841, and was pastor of churches at Athens, Savannah, and Columbus. On the separation of the Northern and Southern branches of the Methodist church he became a member of the New York Conference, filling pastorates in New Haven, Hartford, Brooklyn, and New York. In 1864 he was elected editor of the "Christian Advocate," the official organ of the M. E. church, and continued at the head of that paper until 1876. From 1876 to 1880 he was the editor of the "National Repository." From 1880 to 1884 he engaged in pastoral work, and then became editor-in-chief of the "Methodist Review," which office he held at the time of his death. Besides his laborious editorial work, he published *New York: a Historical Sketch* (1853); *Life-Story of D.W. Clark* (1873); *Fragments, Religious and Theological* (1880); and *Platform Papers* (1880). He received the degree of D.D. from Wesleyan University in 1852, and the degree of LL.D. from Syracuse University in 1878.

**CURTAIN**, in fortification, the portion of rampart connecting one bastion with another.

**CURTSEY**, or **COURTESY**: in law, the right by which a husband enjoys a life estate in the property left by his deceased wife. It is called *right of curtesy*, or *tenancy by the curtesy*, and four circumstances are requisite to its enjoyment: namely, marriage, seizin of the wife, the birth of living issue, and death of the wife. In some of the United States title by curtesy is not recognized.

**CURTILAGE**, in law, the inclosed land occupied by a dwelling and its outbuildings.

**CURTIN**, **ANDREW GREGG**, born in Bellefonte, Pa., April 22, 1815. He was admitted to the bar in 1839, and soon became a prominent politician. In 1854 he was appointed secretary of the Commonwealth, and ex-officio superintendent of public schools, and in this capacity did much for the advancement of the school system of the State. In 1860 he was elected governor of Pennsylvania, and was one of the "war governors" during the civil war. In 1863 he was reelected governor. In 1869 he was appointed minister to Russia, which position he held until 1872, when he returned to this country. In 1881 he was elected to Congress and served for three successive terms.

**CURTIN**, **JEREMIAH**, a noted American linguist, born in Milwaukee, Wis., in 1835. He graduated at Harvard College in 1863. He developed a wonderful facility for acquiring languages, and on leaving college had a good knowledge of French, Spanish, Portuguese, Italian, Roumanian, Dutch, Danish, Swedish, Icelandic, Gothic, German, Finnish, Greek, and Latin. He subsequently mastered the Hebrew, Persian, Sanskrit, Russian, Polish, Bohemian, Lithuanian, Lettish, Hungarian, Turkish, Slovenian, Croatian, Servian, Bulgarian, Mingrelian, Abkasian, and Armenian languages. Of late years he has been making a study of the American Indian dialects, and is said to be proficient in over fifty different tongues.

**CURTIS**, **BENJAMIN ROBBINS**, an American jurist, born in Watertown, Mass., in 1809, died in 1874. He graduated at Harvard College in 1829, was admitted to the bar in 1832, and soon acquired a large practice. In 1851 President Fillmore elevated him to the United States Supreme Court bench. His judicial duties were distasteful to him, and in 1857 he resigned and returned to the practice of his chosen profession in Boston, Mass. He served two years in the Massachusetts legislature, and was one of the counsel for the defense in the impeachment trial of President Johnson, the answer in that celebrated case being mainly his work. While on the Supreme Court bench he stoutly maintained the right of Congress to abolish

slavery, and dissented from the majority of the court in the "Dred Scott" case. After retiring from the bench he edited several series of reports and digests.

**CURTIS**, **GEORGE TICKNOR**, a lawyer and author, brother of Benjamin Robbins Curtis, born in Watertown, Mass., in 1812. He graduated at Harvard College in 1832; was admitted to the bar in 1836, and until 1862 practiced his profession in Boston, when he removed to New York. He published: *Digest of English and American Admiralty Decisions* (1839); *Digest of the Decisions of the Courts of Common Law and Admiralty in the United States* (1840-46); *Rights and Duties of Merchant Seamen* (1841); *American Conveyancer* (1846); *Law of Copyright* (1847); *Law of Patents* (1849); *Equity Precedents* (1850); *Inventors' Manual*; *Commentaries on the Jurisprudence, Practice, and Peculiar Jurisdiction of the Courts of the United States* (1854-58); *History of the Origin, Formation, and Adoption of the Constitution of the United States* (1855-58); *Life of Daniel Webster* (1870); *Life of James Buchanan* (1883); and *Creation or Evolution* (1887).

**CURTIS**, **GEORGE WILLIAM**, an American editor and author, born in Providence, R. I., in 1824. In 1839 he removed to New York and became a clerk in a mercantile establishment. In 1842 he and his elder brother joined the Brook Farm Community, remaining there a little more than a year, and then spent eighteen months longer with a farmer at Concord, Mass. In 1846 Mr. Curtis went to Europe, and spent four years in travel and study, visiting Egypt and Syria. Shortly after his return to this country he became one of the editors of the "New York Tribune." He was also one of the editors of "Putnam's Monthly" from 1852 to 1857. He was a partner in the firm which published this magazine, and was heavily involved in their failure in 1857, sinking his private fortune in meeting the firm's obligations. In 1853 he established the *Editor's Easy Chair* in "Harper's Monthly," and ten years later became the political editor of "Harper's Weekly." He also edited a series of papers in "Harper's Bazaar," entitled *Manners Upon the Road*. For years he has been one of the most earnest and consistent advocates of civil-service reform, and was one of the members of the commission appointed by President Grant to promulgate rules for the regulation of the civil service. Among the important political offices he has filled may be mentioned those of delegate to the Republican national convention of 1860, 1864, and 1876; delegate-at-large to the Constitutional convention of New York in 1867; Presidential Elector in 1868, and chairman of the Civil Service Commission in 1871-73.

**CURTIS**, **JOSEPH BRIDGHAM** (1836-62), United States soldier. He served in 1861 in the 9th New York volunteers as captain; the same year as second-lieutenant in the 4th Rhode Island volunteers, and then first-lieutenant of the same regiment. In 1862 he was appointed as adjutant-general on Gen. Rodman's staff; then became lieutenant-colonel of the 4th Rhode Island regiment. He served in numerous engagements, and was killed while in charge of his regiment at Fredericksburg, Va., Dec. 13, 1862.

**CURTIS**, **JOSIAH**, an American physician, born in 1816. He graduated at Yale and at Jefferson Medical College, and later visited Europe twice in order to study the sanitary condition of the large cities. In 1860 he superintended the mortality statistics of the United States census, and the same year entered the army, remaining with it until 1865. In 1872 he became surgeon and naturalist to the United States geological survey, and one year later chief medical officer of the Indian service. He

has written numerous articles on sanitary surroundings.

CURTIS, NEWTON MARTIN, an American soldier, born in 1835. He was commissioned captain in the 16th New York regiment in 1861, and later lieutenant-colonel, and then colonel of the 142d New York infantry. He acquitted himself in various battles with distinction, and for his services at the capture of Fort Fisher was promoted to brigadier-general, and received a vote of thanks from the legislature of New York. He was brevetted major-general of volunteers in March, 1865, and was mustered out in January of the following year. After the conclusion of the war, Major-General Curtis occupied various important political offices, and was a member of the legislature.

CURTIS, SAMUEL IVES, Ph.D., D.D., an American educator, born in 1844. He graduated at Amherst in 1867, and at Union Theological Seminary in 1870. He traveled in Ireland and Scotland, and was pastor of the American chapel at Leipsic. In 1878 he became professor of Biblical Literature in the Congregational Theological Seminary, Chicago, and the following year was transferred to the chair of Old Testament Literature and Interpretation. Prof. Curtis has written several books on theological subjects.

CURTIS, SAMUEL RYAN (1807-66), an American soldier. He joined the army in 1831; resigned in 1832; became a civil engineer, and then from 1841 to 1846 practiced law in Ohio. During this time he served as captain, lieutenant-colonel, and colonel of the militia, and adjutant-general of Ohio for the purpose of organizing the State's quota of volunteers for the Mexican war. He served in that war as colonel of the 2d Ohio regiment on Gen. Wool's staff, and as governor of Saltillo, Mexico. At the conclusion of the war he settled in the West, and later served two terms and part of a third as Congressman from Iowa, resigning in 1861 to become colonel of the 2d Iowa regiment. He was in several important battles, and in March, 1862, was promoted to major-general of volunteers. At the close of the war he became United States commissioner to examine the Union Pacific Railroad. He died in Council Bluffs, Iowa, Dec. 26, 1866.

CURTIUS, ERNST, a German classical archaeologist and historian, born at Lübeck, Sept. 2, 1814. For sometime he taught in two Berlin gymnasiums; next became extraordinary professor at the University there, and (1844-49) tutor to the Crown Prince of Prussia. In 1856 he was made professor at Göttingen, whence he was recalled in 1868 to become ordinary professor at Berlin. Since 1853 a member of the Royal Academy of Sciences, he became in 1871 one of its permanent secretaries. Among his works are: *Klassische Studien; Anekdota Delphica; Inscriptiones Atticæ Duodecim; Die Akropolis von Athen; Naxos; Olympia; Die Ionier; Die Topographie Kleinasiens; Ephesos Peloponnesos; and Griechische Geschichte.*

CURTIUS, GEORG, a German philologist, born in 1820. In 1842 he taught in Dresden, and in 1849 he became a professor at Prague. In 1854 he was made professor at Kiel, and in 1862 took charge of the department of classical philology in the University of Leipsic. He died in 1885.

CURULE CHAIR, the chair of honor of the old Roman kings, and later of consuls, prætors, "curule ædiles," and some of the other higher magistrates of the Republic having senatorial rank. It was a folding-stool originally of ivory, then of metal, with curved legs crossing.

CURWEN, JOHN (1816-80), an English teacher of chorus singing. He was assistant minister at the Independent Church of Basing Stoke, Hants,

and later was co-pastor at Stowmarket, in Suffolk. In 1844 he became pastor at Plaistow, Essex, but resigned in 1867 to become a printer and publisher. He published various books on the *Tonic Sol Fa* system of teaching chorus singing.

CUSACK, MARY FRANCES, philanthropist, born in Ireland in 1830. In 1859 she became a Roman Catholic, and joined a community of Franciscan nuns engaged in teaching poor girls. In 1861 she established a convent of the Sisters of Kenmare. In 1884 she opened the first house of the new order of the Sisters of Peace at Nottingham, England, and the following year a similar house in Jersey City, N. J. She has published over fifty works, principally on religious subjects.

CUSHING, CALEB, LL.D., an American statesman, born in Salisbury, Mass., in 1800, died at Newburyport, Jan. 2, 1879. He graduated at Harvard College in 1817; studied law; was admitted to the bar, and speedily established a large practice. He served in the Massachusetts legislature in 1825, 1826 and 1833. From 1834 to 1843 he represented the Essex north district of Massachusetts in Congress. In 1843 he was sent to China as a United States commissioner and negotiated the first treaty between those two countries. In 1846 he was again elected a representative in the Massachusetts legislature. During the heated debates upon the question of war with Mexico, he zealously advocated the declaration of war, and on the breaking out of hostilities raised a regiment, which he armed and equipped at his own expense, became its colonel, and accompanied it to Mexico in 1847, reporting to Gen. Taylor. He was subsequently commissioned brigadier-general, and served until the close of the war. During his absence in Mexico his friends nominated him for governor of Massachusetts, but failed to elect him. In 1850 he was again elected to the State legislature, serving two years, when he became by appointment associate justice of the State Supreme Court. From 1853 to 1857 he was United States Attorney-General, and after his retirement returned to the State legislature for three years. In 1860 President Buchanan sent him on a confidential mission to the South Carolina secessionists to try and induce them to defer open hostilities until after the close of his administration. This he failed to accomplish. In 1866 he was appointed one of the commissioners on the revision and codification of the laws of Congress, a work which engaged him several years. In 1868 he visited Bogota on a special diplomatic mission, and in 1870 assisted in the preparation of the protocol of the Treaty of Washington. In 1872 he was one of the counsel for the United States before the Geneva tribunal for the settlement of the Alabama claims. In 1874 he was appointed United States Minister to Spain, where he remained three years. He published a *History of the Town of Newburyport* (1826); *The Practical Principles of Political Economy* (1826); *Historical and Political Review of the Late Rebellion in France* (1833); *Reminiscences of Spain: the Country, Its People, History and Monuments* (1833); *Growth and Territorial Progress of the United States* (1839); *Life of William H. Harrison* (1840); and *The Treaty of Washington* (1873).

CUSHING, FRANK HAMILTON, ethnologist, born in Erie county, Pa., in 1857. At an early age he manifested a love for archaeological pursuits, and assisted Dr. Charles Rau in the preparation of the Indian collections of the National Museum for the Centennial Exposition at Philadelphia, and was curator of the entire collection until the close of the Exhibition. He went, in 1879, as assistant ethnologist with Maj. J. W. Powell's expedition among the Zuni Indians of New



Mexico. Two months had been spent among them, when the expedition returned, leaving Mr. Cushing behind. He adopted the costume, habits and life of the race, and lived as an Indian for three years, studying their habits, language and history. Mr. Cushing has published several works on the Indian customs.

CUSHING, LUTHER STEARNS, a distinguished American jurist, born in Lunenburg, Mass., in 1803, died in 1856. He graduated at the Harvard law-school in 1826, and subsequently became clerk of the Massachusetts assembly, member of the legislature, judge of the court of common pleas, and reporter of the supreme court. He was the author of several important works, but he is chiefly known as the author of *Manual of Parliamentary Practice*, known as *Cushing's Manual*, and recognized as the standard text-book on the subject.

CUSHING, THOMAS, LL.D., an American statesman, born in Boston, Mass., 1725, died in 1788. He graduated at Harvard College in 1744. In 1766 he became a member of the Massachusetts assembly, and was speaker of that body for several years. He was elected to the first Continental Congress in 1774, and was reelected in 1775. He was a candidate for reelection in 1776, but, owing to his opposition to the Declaration of Independence, was defeated. Subsequently he became lieutenant-governor of Massachusetts, and in 1788 was a member of the convention that ratified the Federal Constitution.

CUSHING, WILLIAM (1732-1810), an American jurist. He studied law; was made attorney-general of Massachusetts, judge of probate of Lincoln county, Me., in 1768; judge of the superior court of Massachusetts in 1772, and chief justice in 1777. In 1789 he was appointed Associate Justice of the United States, and in 1796 declined the chief justiceship. Before the Revolution he was almost alone among the superior officers in supporting the cause of Independence. He was one of the founders of the American Academy of Arts and Sciences. He died at Scituate, Mass., the place of his birth, Sept. 13, 1810.

CUSHING, WILLIAM BARKER, an officer of the United States navy, born in Delafield, Wis., in 1842, died in 1874. He entered the Naval Academy in 1857, but did not graduate, resigning in 1861. A few weeks later he entered the naval service as a volunteer officer, and at once commenced a brilliant career. He secured the first prize taken by the United States navy during the war—a tobacco-schooner. His most distinguished service was the destruction of the Confederate iron-clad ram *Albatross*, Oct. 27, 1864. With a steam launch and a volunteer crew, Cushing was able to approach within a short distance of the huge iron-clad before he was discovered. Fire was opened upon him from picket-posts and from the iron-clad, but he ran the launch straight at the huge monster, and swinging the torpedo-boom under the vessel's overhang, coolly discharged the torpedo, the explosion destroying both the iron-clad and the launch. Cushing swam to the shore and escaped. For this affair he was officially thanked by Congress and promoted. In 1872 he was advanced to the rank of commander, and was the youngest officer of that rank in the service.

CUSHMAN, CHARLOTTE SAUNDERS (1816-76), an American actress, born in Boston, Mass., 1816. While a mere child she developed a rich contralto voice, and at the age of twelve sang in church choirs in Boston and aided in the support of her widowed mother's family. Through the assistance of friends of her father she was provided with the best musical instructors, and in 1835 made her de-

buted as an operatic singer in the *Marriage of Figaro*. She sang with great success, but having attempted to sing soprano, her voice suddenly failed. She then studied for the dramatic stage, making her first appearance as *Lady Macbeth* in 1835. In this she achieved even greater success than in opera. Removing to New York, she appeared at the Bowery Theater in leading roles. She subsequently accepted a five months' engagement in Albany, and then became connected with the Park Theater, from 1837 to 1840. In 1842 she undertook the management of the Walnut Street Theater in Philadelphia, remaining there two years. In 1844 she visited England, where she achieved a triumphant success as *Lady Macbeth*, *Rosalind*, *Mrs. Haller*, *Bianca*, and *Emilia*. She also impersonated *Romeo*, her sister Susan assuming the role of *Juliet*. She returned to the United States in 1849, and played throughout the country. In 1852 she again visited England, remaining there till 1857, when she filled a short engagement in the United States, and then went to Rome. She returned to the United States in 1860, and gave several performances for the benefit of the United States Sanitary Commission, the commission realizing over \$8,000 from these benefits. After several years' residence in Rome, she again visited the United States in 1871, and, in addition to her dramatic engagements gave a series of Shakespearian readings, in which she excelled. She closed her dramatic career in Boston, May 15, 1875, and retired to Newport, R. I., where she had erected a handsome villa. Here she was seized with her final illness, and went to Boston to submit to a surgical operation, and died there Feb. 18, 1876.

CUSHMAN, ELISHA (1788-1838), an American clergyman. At an early age he was ordained Baptist pastor in Hartford, Conn., and in 1814 was prominent in the establishment of the Connecticut Baptist Missionary Society. In 1822 he founded a denominational journal called the "Christian Secretary." In 1825 he became pastor of a church at Philadelphia; in 1829, at Fairfield, Conn.; in 1831 at New Haven, and in 1835 at Plymouth, Mass. He died in 1838, a few weeks after his return to Hartford, whither he had gone to take charge of the "Christian Secretary."

CUSHMAN, PAULINE, a United States government spy, born in 1833. She was employed in 1863 to discover the Southern sympathizers and spies in Louisville, and their method of conveying supplies across the lines. The same year she went beyond the lines in order to gain information of the strength of the Confederates, and their contemplated movements. She was captured and sentenced to be hanged, but was left behind at the evacuation of Shelbyville, where she was found by the Union soldiers, who gave her the title of major. Her knowledge of the roads in the South were of great service to the Army of the Cumberland.

CUSHMAN, ROBERT, a Plymouth pilgrim, born in Kent, England, in 1580, died in England in 1625. He was instrumental in obtaining the patent in which the king granted toleration for their form of religion to the American colonists, and Cushman embarked with his family on the *Speedwell*, Aug. 5, 1620. The same year he returned to England to attend to the finances of the colony and send supplies. In 1621 he delivered the first discourse in New England that was published. The same year, while returning to England, he was captured by the French, held two weeks, and then released. In 1623 he obtained a grant of territory on Cape Ann, where a new band of Puritans made the first permanent settlement within the limits of the Massachusetts Bay colony.

CUSSET, a small town in the French department of Allier, 2 miles northeast of Vichy. It has two mineral springs. Population, 5,356.

CUSTARD, a composition of milk or cream, eggs, etc., sweetened with sugar, and flavored according to taste. Custards are of various kinds, such as plain, baked, lemon, orange, almond, and coffee custards.

CUSTER, GEORGE ARMSTRONG (1839-76), an American soldier, born at New Rumley, Ohio, 1839. He graduated at West Point in 1861, and was assigned to duty as lieutenant in the 5th cavalry, taking part in the first battle of Bull Run. He was first aid-de-camp to Gen. Philip Kearney, and subsequently served on Gen. William F. Smith's staff, superintending the balloon ascensions to make reconnaissances. On one occasion, when ordered to select a place for the army to ford the Chickahominy, he plunged into the river alone, waded across, and while on the other side reconnoitered the enemy's position. Gen. McClellan, who witnessed the feat, at once appointed him aid-de-camp with the rank of captain, and at Custer's solicitation permitted him to take some troops with which he crossed the river during the night, and at daybreak the next morning, attacked the picket-post he had discovered the day before, routing them, capturing some prisoners, and the first colors taken by the Army of the Potomac. In May, 1863, he was attached to Gen. Pleasanton's staff, and for his brilliant services at Brandy Station and other engagements of the Rappahannock campaign he was promoted brigadier-general of volunteers, and given command of a brigade. He participated in the battle of Gettysburg, was wounded at Culpeper Court-house, was with Gen. Sheridan during his celebrated cavalry raid in May, 1864, and took part in the battles of Yellow Tavern, Trevilian Station, Winchester, Fisher's Hill, Woodstock, Cedar Creek, Waynesboro, Five Forks, Dinwiddie Court-house, Appomattox, and in fact in all but one of the battles of the Army of the Potomac. In 1865 he was appointed major-general of volunteers. In March, 1866, he was mustered out of the volunteer service, and accepted the lieutenant-colonelcy of the 7th United States Cavalry, and went to Kansas, and served there and on the Plains until 1871. He was then sent to Kentucky, and in 1873 was ordered to Dakota. In July, 1874, he commanded the expedition into the Black Hills. In May, 1876, Gen. Custer led his regiment in a campaign against the Sioux Indians, and on the 25th of June, while in command of a detachment of 277 troopers, fell into an ambuscade, and the entire force was massacred. His remains were removed to the National Cemetery at West Point in 1877.

CUSTER, THOMAS WARD (1845-76), U. S. soldier, brother of Gen. G. A. Custer. He joined the army at an early age, and after service in the West was made aid-de-camp on his brother's staff. In 1864 he was appointed second-lieutenant of the 6th Michigan cavalry, and captured two Confederate flags, for which he received a medal from Congress. In 1865 he served with Gen. Custer in Texas, receiving the brevets of captain, major, and lieutenant-colonel. In 1866 he was second-lieutenant in the 1st infantry of the Regular Army, and afterwards first-lieutenant in his brother's regiment of cavalry. Gen. Custer said of him: "Tom should be the general and I the captain." He was killed in the battle of the Little Big Horn, June 25, 1876.

CUTHBERT, a railroad junction and county-seat of Randolph county, Ga. It is the seat of the Southwestern Georgia Agricultural College, of two female colleges, and a high school.

CUTHBERTSON, JOHN (1718-91), a Scottish-American clergyman. He was ordained in 1749, and went to Ireland to preach to the Covenanters who had taken refuge there during the Scottish persecutions. In 1751 he came to America, and preached to some of his followers on the Cumberland River. In 1773 he labored in Chester, Lancaster, and York counties, Pa. His diary shows that he preached on 2,452 days, baptized 1,806 children, officiated at 204 marriages, and rode on horseback over 70,000 miles.

CUTLASS, a sword about three feet long, broad and straight, with a japanned hilt. Cutlasses are mostly used by sailors in the navy, when boarding and taking possession of the enemy's ships.

CUTLER, MANASSEH, LL. D., an American clergyman, born in Killingly, Conn., May 3, 1742, died at Hamilton, Mass., July 28, 1823. After graduating at Yale in 1765, he engaged in the whaling business, but continued his studies, and in 1767 was admitted to the Massachusetts bar. Finding the practice of the law uncongenial he entered upon a course of theological study, and in 1770 was licensed to preach. In 1771 he was ordained pastor of the Congregational society of Hamlet parish, now the town of Hamilton, and continued in this relation until his death. During the closing years of the Revolutionary war his parish was without a physician, and Mr. Cutler at once applied himself to the study of medicine, and soon acquired a sufficient knowledge of the science to provide the community with intelligent and skillful medical service. He was one of the founders of the Ohio Company, an association of Revolutionary officers, formed for the purpose of having their bounty lands located together, and Mr. Cutler secured from the government for this company a grant of 1,500,000 acres of land northwest of the Ohio River. In 1787 an expedition consisting of forty-five men left Cutler's house, and settling on this tract of land, founded the town of Marietta, Ohio. Cutler visited the colony, making the journey of 750 miles in a sulky, but did not remain. He received the degree of LL. D. from Yale in 1791, and in 1795 was tendered the appointment of judge of the supreme court of Ohio territory, but declined the commission. Later he became a member of the Massachusetts legislature, and from 1801 to 1805 served as a Federalist in Congress, declining a reelection.

CUTLERY. See Britannica, Vol. VI, pp. 733-735.

CUTT, JOHN, colonial governor of New Hampshire, born in England in 1625, died at Portsmouth, N. H., March 27, 1681. He came to America some time prior to 1645, and settled in Portsmouth, where he established himself as a merchant and mill-owner. In 1679 he was appointed president of the province by Charles II, and continued in that office till his death. His descendants now spell the name "Cutts."

CUTTER, a name given to two kinds of small vessels. The cutters which are used by yachtsmen, smugglers, and revenue cruisers, and are built with special reference to speed, are small vessels with one mast and a bowsprit. They are much like sloops in rig, the distinction being that in a cutter the jib has no stay to support it. The cutters belonging to ships of war are clincher-built boats, from about 24 to 28 feet in length. Two such cutters are supplied to every ship of war, except those of the smallest kind.

CUTTINGS, branches or portions of branches of trees or shrubs, employed to produce new plants, by the insertion of the lower end into the earth. Willows, fuchsias, currants, gooseberries, etc., are easily propagated in this way; but many other



plants, commonly propagated by cuttings, require great attention on the part of the gardener. The branches which are young, but not less than a year old, are best adapted for this purpose.

CUTTING, JOHN T., of San Francisco, Cal., a merchant, was born in Westport, N. Y., Sept. 7, 1844; removed to Wisconsin in 1855, and lived in that State and Illinois until 1877, receiving his education in Illinois. He served in the Union army during the war of the Rebellion; removed to California in 1877; was an active member of the National Guard, State of California, retiring in February, 1891, with the rank of brigadier-general. In politics he is a Republican, and was chairman of the Republican county committee in San Francisco. In 1890 was elected a Representative from the Fourth Congressional District of California to the 52d Congress.

CUTTING, SEWALL SYLVESTER, D. D., educator, born in Windsor, Vt., Jan. 19, 1813, died in Brooklyn, N. Y., Feb. 7, 1882. He was a graduate of the University of Vermont, and in 1836 was ordained pastor of the Baptist church in West Boylston, Mass., and subsequently became pastor of the Baptist church in Southbridge, Mass. In 1845 he became editor of the "Baptist Advocate" in New York. The name of the paper was changed to the "New York Recorder," and under his management rapidly grew in circulation and influence. He retired from the "Recorder" in 1850, and for a short time was secretary of the American and Foreign Bible Society. He was editor of the "Christian Review" from 1849 to 1852, and one of the editors of the "Watchman and Reflector," a Boston publication, from 1851 to 1853. In the latter year he again became editor of the "New York Recorder." In 1855 the "New York Baptist Register" was consolidated with the "Recorder," and the name changed to "The Examiner." From 1855 to 1868 he held the chair of professor of rhetoric and history in the Rochester University. He published *Historical Vindications* (1859), *Struggles and Triumphs of Religious Liberty* (1876), and *Ancient Baptistries*.

CUT-WORM, a term used loosely of worms or grubs destructive to cabbage and beans.

CUYAHOGA FALLS, a town of Summit county, Ohio, on the Cuyahoga River, which is here inclosed by walls of rock 200 feet high. The river furnishes an abundant water-power, which is applied in running wire-mills, paper-mills, rolling-mills, soap and glue factories.

CUYLER, THEODORE LEDYARD, clergyman, born in Aurora, N. Y., Jan. 10, 1822. He graduated at Princeton College in 1841, and at the Princeton Theological Seminary four years later. In 1848 he was ordained pastor of the Presbyterian church in Burlington, N. J., and shortly afterwards became pastor of the 3d Presbyterian church in Trenton, N. J. In 1853 he accepted the pastorate of the Market Street Reformed Dutch church in the city of New York. He continued to minister to this society until 1860, when he accepted the invitation of the Lafayette Avenue Presbyterian church, of Brooklyn, N. Y., to become its first pastor. Under Dr. Cuyler's charge this society has grown to be one of the largest and most prosperous in the denomination. In addition to his ministerial labors Dr. Cuyler has been a regular contributor to the religious press, and has also published *Stray Arrows* (1851); *The Cedar Christian* (1863); *The Empty Crib* (1868); *Heart Life* (1871); *Thought Hives* (1872); *Pointed Papers* (1876); *From the Nile to Norway* (1881); *God's Light on Dark Clouds* (1882); *Wayside Springs* (1884); and *Right to the Point* (1884). He has also written a large number of temperance tracts.

CYANITE, KYANITE, or DISTHENE, a mineral composed of alumina and silica. It often occurs crystallized, and generally in broad prisms; varies in color, but is frequently of a fine sky-blue, slightly tinged with violet; is transparent, and sometimes beautifully opalescent. It is found in different parts of Europe, Asia, and America, and in several localities in Scotland.

CYANOSIS, or CYANOPATHIA, a condition in which the skin of a new-born infant becomes blue. It is the result of congenital disease or malformation of the heart. Cyanosis may cause death a few days after birth, normal development may take place and the child recover, or he may live for years with this undeveloped condition of the blood-vessels.

CYANOTYPE PROCESSES, in photography, those processes in which the compound radical cyanogen is employed; they were discovered by Sir John Herschel, and depend for their successful practice on the reduction of a persalt of iron to the state of protosalt, by the action of light, in the presence of organic matter.

CYATHOPHYLLUM, a genus of fossil stony corals, with a simple or branched polyparium, internally lamellated, the lamella having a quadripartite arrangement. The older portions are cut off by transverse "tables" or septa, and the base of the stem is often supported by root-like processes. This genus first appeared in the Silurian, was abundant in the Devonian, and disappeared at the close of the Carboniferous epoch.

CYCHLA, a genus of fishes of the family *Chromidae*, of which many species are found in the rivers of tropical America. They have small and crowded teeth, forming a large band; are remarkable for the beauty and brilliancy of their colors, and some of them are highly esteemed for the table.

CYCLE, a term used in chronology to denote an interval of time in which certain phenomena recur in the same order. Cycles have chiefly arisen from the fact that neither the year (the period of the earth round the moon), nor the month (the period of the moon round the earth), can be measured by days, or even by hours, so exactly as not to leave fractions. Cycles have been invented to swallow up these fractions of time in whole numbers expressing days, in such a way that after a certain number of revolutions of the body whose period has been put against that of the earth on her axis, the body shall at last occupy the same place in the heavens and calendar as it did when the cycle commenced. Of the numerous cycles or periods of this kind that have been established the more important are noticed under CALENDAR, BRITANNICA, Vol. IV, pp. 669-70, and ASTRONOMY, Vol. II, p. 747.

CYCLOID. If a circle roll along a straight line in its own plane, any point on the circumference describes a curve which is called a cycloid. This is the most interesting of what are called the transcendental curves, both from its geometrical properties and its numerous applications in mechanics. In dynamics, for example, we find that a heavy particle descends from rest from any point in the arc of an inverted cycloid to the lowest point in the same time exactly, from whatever point of the curve it starts.

CYCLOBRANCHIATA, an order of gasteropodous mollusks, in which the gills usually form a series of lamellae, surrounding the body between the foot and the mantle. To this order belong the univalve *Patellidae*, or limpets, and the multivalve *Chitonidae*, or chitons.

CYCLONES (Gr., *kuklon*, whirling), a circular or rotatory storm, revolving around a calm-center, the

whole advancing at a rate of from two to fifty miles an hour. They are formed by the meeting of opposing currents of air, to wit: polar or equatorial winds flowing side by side, or one above the other, each constantly struggling for the mastery. Wind, or the motion of the air, is the consequence of a disturbance of equilibrium in the layers of the atmosphere, and tendency of its motion is to restore the equilibrium which has been previously destroyed. Cyclones have never been observed on the equatorial line. North of the equator, their rotation is invariably from right to left; south of the equator, from left to right. The center of the monster vortex is invariably calm, and travels forward with the storm. According to Humboldt, a velocity of 200 to 300 miles an hour has frequently been reached in portions of the storms. In an official statement regarding these singular atmospheric outbursts made by the Signal Service of the United States from obtainable data for a hundred years, it was authoritatively stated that in 600 cyclonic storms, the direction of the "whirl" in the cloud was invariably from right to left, and that the temperature preceding the storm was sultry, sometimes oppressively so.

A marked peculiarity of the storm is in the formation of the cloud. It often resembles a body of smoke issuing from a burning building, and rolling upward in fantastic shapes to a great height. If dark, and presenting a deep greenish hue, it forebodes a great destruction. The form is various, but inclines to the funnel shape, and as it passes over the country is productive of an angry and terrifying roar. In all directions the clouds around the central storm seem to be in consternation. They break up into small portions, dash over and into each other, at one time darting toward the earth, and then rushing far upward, but steadily joining the monster whirl as it rapidly advances. The roaring accompanying the approaching cyclone is compared to the heavy rumbling of an immense freight train moving over a bridge or through a tunnel, intensified to a degree that paralyzes the senses of man and beast alike. The cyclone may or may not be attended by thunder and lightning. In the effects produced many apparently fantastic freaks are indulged in. The path of the storm is so closely marked that many cases are noted where one side of a tree has been trimmed off its branches clear to the trunk, as if by monster knives, while not a leaf on the other side was disturbed. Paths are made in forests which for accuracy of bordering would seem to have been the result of careful engineering skill. Portions of houses have been completely wrecked and carried to enormous distances, while other portions remained untouched.

CYCLOPS, a genus of small fresh-water crustaceans, type of a family (*Cyclopidae*) in the order *Copepoda*. Various species are common as active swimmers in fresh-water pools or slow-flowing brooks, and a few forms have been recorded from the sea. They have an elongated body without a shell, with four forked thoracic feet and a five-jointed abdomen. The head region is not distinct from the first ring of the thorax; there is a pear-shaped segmented body and a long abdomen; both pairs of antennae are long, and in the male the anterior pair form claspers; the mandibular and maxillary palps are degenerate; and a heart is said to be absent. The average length of the commonest species is from two to three millimeters. A marked feature is the single median eye, usually bright crimson and sparkling like a gem, and not less noticeable are the two large egg-bags carried by the females. They eat both animal and vegetable matter, and are very prolific.

CYCLORAMA, a series of views, which, being wound round cylinders, are made to pass in consecutive order before the spectator, so as to produce the effect of motion on his part, as the banks of a river are seen from a boat, or the country from a railway-car.

CYCLOSIS, the name employed to designate certain still very imperfectly understood movements of the contents of cells in plants, first observed and described by C. H. Schultz. As they have been observed in plants of the most dissimilar natural orders, it is not unreasonably presumed that they prevail throughout the entire vegetable kingdom, and characterize the active life of all vegetable cells.

CYMA: in architecture, a molding consisting of a hollow and round conjoined. When hollow in the upper part, it is termed *cyma recta*; when hollow in the lower part, it is called *cyma reversa*.

CYMBALS, a pair of concave metal plates, which, when struck one against the other, produce a loud harsh sound of no fixed pitch. They vary in size from small finger-cymbals or castanets to large orchestral cymbals intended for use with the large drum. The notes in music for this instrument are all placed on the same line or space, in rhythmical succession. Instruments somewhat similar in character are known to have been in use since the earliest historic times. The best cymbals are those made in Turkey and China. The name is also applied to a musical instrument made of steel wire, in a triangular form.

CYME, a term employed in botany to designate those forms of inflorescence which are *definite* or *centrifugal*—that is, in which the main axis ends in a flower, but bears one or more lateral branches which again terminate in flowers, but not before producing secondary branches which continue the same process as far as growth permits.

CYNANCHE, a term applied to the severer forms of sore throat.

CYNANCHUM, a genus of *Asclepiadaceæ*, of which some species have been used medicinally. The Indian *Cynanchum extensum* yields fiber, and *Cynanchum ovalifolium*, a native of Penang, yields caoutchouc of excellent quality.

CYNODON, a genus of grasses, having digitate or racemose spikes, so named from its sharp-pointed underground shoots. The most important species, *C. dactylon*, is the widely distributed and well-known Bermuda grass. It is the principal fodder and pasture grass of India, where it is known by the names of *dhob*, *doorba*, etc.

CYNOMORIUM, a genus of the curious parasitic order *Balanophoraceæ*. *C. coccineum*, a plant of a strange fungus-like appearance, is found in the islands of Malta and Gozo. It was long known as *Fungus Melitensis*, and enjoyed the highest reputation as a styptic, besides being used as an astringent in dysentery and other maladies. These uses, however, depended on the doctrine of signatures alone, its scarlet color and blood-like juice being interpreted as providential indications of its curative destination for all injuries or diseases accompanied by bleeding.

CYNOSURE (Gr., *lynosoura*; literally, "the dog's tail"), the constellation of the Little Bear. As the pole star is the principal star of the constellation, the eyes of mariners are frequently directed to it, hence the common application of the term cynosure to anything that strongly attracts attention; a center of attraction.

CYNTHIANA, a city and county-seat of Harrison county, Ky. It has a female college, flour mills, and carriage factories, and manufactures the famous "Bourbon" whiskey. There is a fine race-course



here. The place was named from Cynthia and Anna Harrison, daughters of an early settler. Three battles between the Union and Confederate forces were fought here, the dates being July 17, 1862; June 11, 1864, and June 14, 1864.

CYPERACEÆ, the order of reeds and sedges, nearly akin to grasses, but easily distinguished by their solid, unjointed, generally triangular stems, undivided leaf-sheaths, and absence of paleæ. There are about 2,000 species, widely distributed throughout all climates, but more especially in temperate and cold regions, and in marshy soils, of which they often take almost entire possession.

CY-PRES. See *Britannica*, Vol. VI, p. 745.

CYPRESS. See *Britannica*, Vol. VI, pp. 745-46.

CYPRINIDÆ, a large family of fresh-water bony fishes, with open swim-bladders. Babel, bream, carp, chub, dace, gold-fish, gudgeon, minnow, roach, tench, are familiar examples. They are distinguished by their small toothless mouths, naked head, usually scaled body, and by the absence of the adipose fin. The family includes over a hundred genera, and eight times as many species.

CYPRINODONTIDÆ ("toothed-carp"), a family of small bony fishes, with open swim-bladders. They are allied to carps (*Cyprinidæ*), but the mouth bears teeth, the head and body are scaled, and there are never barbules. The family includes 20 genera and over a hundred species, widely distributed in the warm and tropical zones, both fresh-water and marine.

CYPRIOTE ART. See under *CYPRUS*, *Britannica*, Vol. VI, pp. 747-50.

CYPRIS, a very common small fresh-water crustacean, type of a family (*Cypridæ*) in the order *Ostracoda*. Like other ostracods, this small "water-flea" has an unsegmented body, seven pairs of appendages, a rudimentary abdomen, and a bivalve mollusk shell inclosing all. The shell of cypris is dainty and elastic; the posterior antennæ bear a long tuft of bristles on their second joint; the second pair of maxillæ have a small gill appendage; the posterior limbs are very irregular.

CYPRUS, an island and British colony in the Levant, 60 miles from the coast of Asia Minor and 41 from the coast of Syria (see *Britannica*, Vol. VI, pp. 747-50). It is administered by Great Britain, under a convention concluded between the representatives of England and the Sultan of Turkey at Constantinople, June 4, 1878. Its area is 3,584 square miles, and the population is 186,173.

The island is divided into six districts with Nicosia as its capital. There is no public debt, and the revenue for 1890 was £174,499, the expenditures being £106,338. The chief products of Cyprus are corn, cotton, carobs, linseed, olives, silk, raisins, fruit, vegetables, cheese, wool, hides, and wine; and the minerals are lead, building and ornamental stones, and salt. The imports for 1890 amounted to £244,324, and the exports to £314,628. English, French and Turkish coins, and Turkish weights and measures are current.

CYRENIUS, a Grecized form of Publius Sulpicius Quirinus, named in Luke ii as governor of Syria. He received his appointment as governor A. D. 6, but the difficulty in harmonizing this with Luke is overcome by admitting that he had been governor also at an earlier date—according to Zumpt, from 4 B. C. to 1 B. C.

CYSTIN, or CYSTIC OXIDE, forms a rare variety of urinary calculus. Its chemical composition is  $C_2H_4NSO_2$ , and it forms a whitish or dirty yellow deposit consisting of six-sided crystalline tablets. It is soluble in ammonia, and is thereby distinguished from the similar crystals of uric acid.

CZAR, TSAR, a title of the Russian emperor. The word is derived from the old Slavonic language, and signifies much the same as German *Kaiser*, Latin *Cæsar*, to which it probably owes its origin. After the twelfth century, the Russian annalists gave the title of czar to the Mongol princes of Russia. In general, however, the rulers of the various Russian provinces were called grand dukes till the 16th century. Ivan IV, crowned in 1547, was the first independent Russian prince who assumed the title. From this time the Russian monarchs called themselves Czars of Moscow; and after the conquest of Little Russia and Smolensk, Czars of All the Russias. The title *czar*, though the equivalent of *emperor*, was not recognized as involving imperial rank at the time it was assumed by Ivan; and when Peter I, in 1724, assumed the additional title of *imperator*, several European powers at first refused to sanction it, but ultimately consented to do so.

CZERMAK, JOHANN NEPOMUK, a German physiologist, born in Prague, June 17, 1828, died Sept. 16, 1873. He studied at Vienna, Breslau and Würzburg, and was professor successively at Cracow, Pesth, Jena and Leipsig. Prof. Czermak was the founder of laryngoscopy. His principal work is *Der Kehlkopfspegel*.

## D

## DAA-DAGG

**DAA, LUDVIG KRISTENSEN**, a Norwegian politician and publicist, born in Saltdalen, Aug. 19, 1809, and in 1862 became professor of history in Christiania. He has written much on political and historical subjects. His chief works are: *Svensk-norsk Handorobog* (1841), *Udsigt over Ethnologien* (1855), *Jordbeskrivelse for den norske Almue* (1857), and *Om Nationaliteternes Udvikling* (1868). Died in 1877.

**DAAE, LUDVIG LUDVIGSSON**, Norwegian historian, born in Aremark, December 7, 1834. He was elected professor of history in 1876. He has written the history of Christiania, and has traced the chronicles of Norway during the Danish possession. His works are remarkable for thoroughness and impartiality.

**DAB** (*Platessa limanda*), a small, flat fish closely resembling the plaice and flounder, but differing from them somewhat in form and color. It is common on all sandy parts of the British coasts. It is about 12 inches in length and light brown in color. A larger but less plentiful species is known as the lemon dab (*P. microcephala*). The rusty dab (*P. ferruginea*) is occasionally found on the New England coast.

**DABOLL, NATHAN**, a teacher of Connecticut, born about 1750, died at Groton, Conn., March 9, 1818. He was the author of the famous "Daboll's Arithmetic," and also of a treatise on navigation.

**DACELO**, a genus of king-fishers. The best known species is the *Dacelo gigas*, of New South Wales, commonly called the "laughing jackass." The name was suggested by its harsh cry, uttered at early dawn. It inhabits hollow tree trunks, and feeds upon fish, reptiles, etc.

**DACI**, inhabitants of Dacia, a barbarous people, supposed to have emigrated from Thrace. They were also called Gete, which is thought by some critics to identify them with the Goths.

**DA OOSTA, JACOB M., M. D.**, born in the island of St Thomas, West Indies, Feb. 7, 1833. He acquired his classical education in Germany, and his medical in Philadelphia, where he graduated at Jefferson College in 1852. He was appointed lecturer on clinical medicine in that institution, and in 1872 was chosen professor of the theory and practice of medicine. He has made a number of valuable contributions to medical literature. His specialty is disease of the heart and lungs.

**DACRES, SIR SYDNEY C., K. C. B.** (1804-84), English admiral, born at Totnes, Devonshire, England, Jan. 9, 1804, died March, 1884. He entered the British navy at 13 years of age, was lieutenant in the reduction of the Morea Castle in 1828; captain in the Crimean war, and commanded the first iron-clad squadron. He was second in command in 1861 on the North American and West India station when the Trent affair was pending between England and America, and held various other offices of honor.

**DACRYDIUM**, a genus of trees of the natural order *Taxaceæ*, chiefly natives of Australia and New Zealand. The Huon Pine (*D. Franklinii*) is valuable for its timber, which is excellent for spars for naval purposes. *D. taxifolium*, the Kakateri tree of New Zealand, attains a height of 200 feet, and is also valuable for timber.

**DACYTL**, a metrical foot in Greek and Latin poetry, consisting of one long and two short syllables. In English it is applied to a measure consisting of one accented and two unaccented syllables.

**DACTYLOLOGY**, the art of communicating thoughts by the fingers.

**DACTYLOS**, a Greek measure, equal to 0.7586 inches.

**DADD, GEORGE H., M. D.**, veterinary surgeon, born in England about 1813. He removed to the United States in 1839, where he became well known as a writer on veterinary science.

**DADEVILLE**, a village of Alabama, situated about 50 miles northeast of Montgomery. It is the capital of Tallapoosa county. It has a mineral spring.

**DADO** (*It.*, a die), a term applied in architecture to the body of a pedestal, the cubic block between the base and cornice. It is also applied to a protection running around the bottom of the walls of a room, more commonly known as wainscoting.

**DADUR**, a town of Beloochistan, five miles east of the Bolan Pass. It contains about 3,000 inhabitants. It is said to be one of the hottest places in the world, although situated in the 30th degree of north latitude. The British troops here routed a Kelat force in November, 1840.

**DÆDALUS**, according to Greek mythology the inventor of the auger, saw, and other tools. The building of the Labyrinth of Crete is also ascribed to him, together with various artistic inventions. By ascribing inventions to Dædalus the Greeks seem to have meant that they belonged to the time when the arts first sprang up.

**DAENDELS, HERMAN WILHELM**, a Dutch general, born at Hattum, in Gueldres in 1762, died June, 1818. He participated in the revolution in Holland in 1787, and was compelled to seek refuge in France. He rendered important service to Dumouriez in the campaign of 1793, and was made general of brigade. He also rendered service in 1799. While in the service of the king of Holland he conquered East Friesland, and, beside other rank was made governor-general of the Dutch East Indian possessions. He published a work upon his administration in Java, which was an important contribution to knowledge concerning the island.

**DAET**, a town of the island of Luzon, one of the Philippines. It is situated on a river of the same name, and is the capital of the province of North Camarines. Population, 7,702.

**DAG**, a clumsy pistol, used in the 15th and 16th centuries. In the *Spanish Tragedy*, published in 1603, one of the characters is represented as shooting the dag.

**DAGG, JOHN LEADLEY, D. D., LL.D.**, born in Middleburg, Va., Feb. 13, 1794, died June 11, 1884. He was pastor of the Fifth Baptist church of Philadelphia from 1825 to 1834, and principal of Alabama Female Athenæum from 1836 to 1844. During the following ten years he was president of Mercer University, and professor of systematic theology from 1854 to 1856. He was the author of a number of valuable and popular works, one of them *Moral Science*, being used as a text-book in several colleges.



DAGGETT, DAVID, LL.D., an American lawyer and jurist, born at Attleborough, Mass., Dec. 31, 1764, died April 12, 1851. He was United States Senator from 1813 to 1819, and was appointed in 1826 Kent professor of law at Yale College, of which he was a graduate. He became chief justice of Connecticut in 1832.

DAGGETT, OLIVER E., D.D., an American clergyman, born at New Haven, Conn., Jan. 14, 1810, died at Hartford, Aug. 31, 1880. He graduated at Yale College, and in 1828 became pastor of the South Church in Hartford, Conn. In 1837 he was ordained pastor of the First Congregational church of Canandaigua, N. Y., which position he held for nearly twenty-three years. He was subsequently professor of divinity in Yale College, and pastor of the Second Congregational church of New London, Conn. He assisted in the compilation of the *Connecticut Hymnbook*, was a frequent contributor to the "New Englander" and author of printed sermons.

DAGO, an island in the Baltic Sea, belonging to the Russian government of Esthonia. It is about 34 miles in length and 15 in breadth. The soil is sterile, and the coasts rocky. The population, numbering about 10,000, are chiefly Esthonians employed in fishing and cattle-rearing.

DAGO, a name originally given by sailors to Spaniards, Portuguese, and Italians in general. It is claimed by some to be a corruption of the frequent Spanish name *Diego*, equivalent to the English name James or Jack. By others it is a title given exclusively to those born of Spanish parents, especially in Louisiana. By others, again, it is claimed to be purely a corruption, or a nickname derived from *hidalgos*, which, though a Spanish and not an Italian word, came by some accident to be sneeringly applied to a foreigner of Latin Europe, who chanced to be out of his element. Whatever the royal or semi-royal derivation of the word *hidalgos* may have been, the prostituted derivative is especially applied to that lower class of the Southern Europe Latin element employed in America in the cheaper labor pursuits. The peculiar class of unskilled laborers to which the term especially applies, is that whose members herd together as closely as they can dispose themselves, in anything that is covered by the semblance of a roof, performing every office of nature in a promiscuous way in the same tumbled quarters.

DAGOBERT I, king of the Franks, a scion of the Merovingian family, born about 602. He was elected king of Austrasia in 622, and at the death of his father in 628, he succeeded to the kingdom of Neustria, and to these two added a third, that of Aquitaine, after the death of his brother Charibert, in 631. He thus became ruler of the whole Frankish empire, and turned his attention to restricting the power of the feudal lords and prelates. One of his greatest feats was reducing the Frankish laws to a code. Before his death he placed his son Siegbert on the throne of Austrasia. See *Britannica*, Vol. IX, p. 530.

DAGOBA, or DAGOPA, the name in Ceylon for monumental structures containing relics of Buddha. The more general name is Stupa, or Töpe.

DAHL, KONRAD, a Norwegian writer, born near Trondhjem, June 24, 1843; resided for several years in the extreme north of Norway, and subsequently removed to Bergen, where he has occupied the position of prison chaplain since 1873. He is author of a series of stories descriptive of life in the North of Norway. Among them are: *Loven* (1874); *Finnegutten* (1874); *Edda Mansika* (1875); and *Ishavsskipperen* (1878).

DAHLEN, a town of Germany in the Prussian Rhine province. It has extensive manufactories. Population, 6,000.

DAHLGREN, FREDRIK AUGUST, a Swedish poet and critic, born in Wermland, Aug. 20, 1816. He has been secretary of the society of Swedish antiquarians since 1843, and has edited the annual *Handlingar af Svenska Akademien* since 1854. His songs (2 vols., 1875-76) are exceedingly popular. Among the best of his dramas are *Vernländingarne* (4th edition, 1879); *Ett Eventyr på Hegeberg* (1854), and *Kaffeförbudet* (1855). Besides editing a number of valuable works, Dahlgren has translated dramas from Shakespeare, Heiberg, Lessing, and others; and in 1866 he published *Anteckningar om Stockholms Theater*, a history of the Swedish theaters, containing a list of all the dramas played from 1737 to 1863.

DAHLGREN, JOHN ADOLPH (1809-70), American rear-admiral, was born in Philadelphia, Nov. 13, 1809, died July 12, 1870. He entered the navy as a midshipman Feb. 1, 1826, and was successively passed midshipman, lieutenant, and commander. On the outbreak of the civil war he was placed in charge of the defenses of Washington on the left, and the preservation of the navy-yard from falling into the hands of the Confederate forces was due to his firmness and sound judgment. In 1862 Dahlgren was appointed chief of the bureau of ordnance, and in 1863 commissioned rear-admiral. The following July he was placed in command of the South Atlantic blockading squadron, a fleet of about 90 vessels. As a result of his active operations Fort Sumter was silenced and a safe anchorage secured for the monitors, thus putting a stop to blockade-running. In 1866 he took command of the South Pacific squadron, and in 1869 was appointed commandant of the Washington navy-yard. He was the inventor of the gun which bears his name, and the author of several works on ordnance which have been used as text-books by the Government.

DAHLGREN, ULRIC (1842-64), son of Rear-Admiral Dahlgren, born in 1842. He served as aide-camp to Gens. Burnside and Hooker, and distinguished himself by his gallantry. He was commander of a body of cavalry in a raid upon Richmond, and was killed in the retreat from that city, March 4, 1864.

DAHLGREN GUN, an improved form of ordnance named for its inventor, Admiral Dahlgren. It was the result of a careful series of experiments on the construction of large guns. The chief improvement consisted in having relatively less metal in front of the trunnions, and more behind, where there is the greatest strain in firing. The 9-inch and 11-inch Dahlgren are still the favorites of American seamen, and are unsurpassed by any boat-gun in the world.

DAHLONEGA, a village of Georgia, county-seat of Lumpkin county. Before the war it contained a branch mint of the United States, and the building has been converted into the North Georgia Agricultural College. Gold mines have been opened in the vicinity.

DAHN, JULIUS SOPHUS FELIX, a German publicist, historian and poet, born at Hamburg, Feb. 9, 1834; studied law, philosophy and history at Munich and Berlin; became extraordinary professor at Munich in 1862; ordinary professor at Würzburg in 1863, and in 1872 was appointed to the chair of German jurisprudence at Königsberg. Among his contributions to public law are: *Das Kriegesrecht* (1870); *Handelsrechtliche Vorträge* (1875); *Deutsches Rechtsbuch* (1877); and *Deutsches Privatrecht* (1878). Of his historical works the chief are: *Prokopius von Cäsarea* (1865); *Die Könige der Germanen* (1861-71);

*Westgotische Studien* (1874), and *Geschichte der Deutschen Urzeit* (1885). He has also written a series of popular historical romances and many lyrical and dramatic poems.

**DAHOMÉY.** For its earlier history, climate, productions, physical features, native customs, etc., see *Britannica*, Vol. VI, pp. 764-67. The kingdom of Dahomey, formerly the most powerful on the Slave Coast, Upper Guinea, has in recent years been greatly reduced in size and strength, especially by the long and disastrous wars waged against Abeokuta and other petty Yoruba states on its eastern frontier. It now comprises an area of about 15,000 square miles, with an estimated population of a little over 200,000, extending from Yoruba eastward to the river Volta, separating it from Ashanti, and bordering northwards on the Wagera territory. It is now entirely an inland state. According to the recent treaty of delimitation between British and French West African possessions, Dahomey is within the sphere of France. Early in 1890 complications arose with France respecting the disputed stations of Porto Novo and Kotonu on the south coast; but after a brief series of hostilities peace was concluded in September, 1890, Dahomey recognizing the French claims to those places.

**DAHOON**, or **DAHOON HOLLY**, the *Ilex dahoon*, a small evergreen tree, having a white soft, close-grained wood. It is allied to the holly, and is found in the warmer parts of the United States.

**DAHRA**, a district of Algeria, the scene of a massacre in 1845. The Ouled Riahs, a Kabyle tribe, being pursued by the French under Colonel Pelissier, took refuge in the immense caverns of the district, where, upon their refusal to surrender, they were suffocated by the smoke from fascines kindled at the entrances. The deed was formally condemned by Marshal Soult, then minister of war.

**DAIMIO**, the title of feudal lords of Japan. They were petty sovereigns, 264 in number. This old feudalism was abolished by the recent revolution in Japan. See *Britannica*, Vol. XIII, pp. 578-83.

**DAINGERFIELD**, county-seat of Morris county, Texas, situated 17 miles southeast of Mount Pleasant.

**DAIR-EL-KAMAR**, a town of Syria, the capital of the Druses, situated on the edge of a picturesque glen of Mount Lebanon. On the opposite side of the glen are the ruins of the palace Bteddin, formerly the residence of Emir Beshir, a ruler of Lebanon. It has a population of about 8,000, chiefly engaged in the cultivation of mulberries, olives, and vines.

**DAIS**, a term used with considerable latitude by medieval writers. Probably the word with all its significations was introduced from its French meaning, a "canopy." It is most frequently applied to the platform at the upper end of a dining-hall, where the table is spread for distinguished guests, also a canopied seat at that table. See *Britannica*, Vol. II, p. 463.

**DAISY.** See *Britannica*, Vol. VI, p. 773.

**DAKOTA CITY**, a railroad junction, the capital of Humboldt county, Iowa. Humboldt College is situated one mile north of the town.

**DAKOTA CITY**, capital of Dakota county, Neb. It is located on the west bank of the Missouri.

**DAKOTA INDIANS**, or **SIoux**, a collection of bands of American savages, inhabiting parts of Nebraska, Wyoming, the Dakotas, etc. Their language differs from that of most of the Indian tribes. They were found by the French in 1640, and were then occupying the extensive regions bounded on the north by Lake Winnipeg, south by the Arkansas River, east by the Mississippi, and west by

the Rocky Mountains. All their lands east of the Mississippi were ceded to the United States in 1837, and of the land west of the Mississippi they sold 35,000,000 acres in 1851. The Government failing to keep its agreement with them, hostilities broke out, which were only put down by armed force. A new treaty was concluded, and again unfulfilled by the Government. As a result there was a general rising of the Dakotas in 1862, and more than a thousand settlers were killed. Order was, however, soon restored. New complications arose in 1875, occasioned by the discovery of gold in the Black Hills, a part of the Sioux reservation. The Indians refused to sell to the Government except at an enormous price. Surveyors being sent into the country, the Sioux prepared for war, and defeated Gen. Custer in 1876. Soon after this a large number fled to British dominions, materially reducing the strength of the tribe. See *Britannica*, Vol. XII, pp. 827-31.

**DAKOTA RIVER** rises in the northeastern part of North Dakota and flows south through South Dakota, emptying into the Missouri River about eight miles below Yankton. Estimated length, 800 miles.

**DAKOTA.** See *Britannica*, Vol. VI, pp. 773-74. See also **NORTH DAKOTA** and **SOUTH DAKOTA**, in these Revisions and Additions.

**DALAMOW**, a city of India, on the Ganges. It is a reputed holy place, containing two antique temples of Siva. Population, 10,000.

**DALARIADA**, the ancient name of a territory in Ireland which is now the southern half of the county of Antrim and the greater part of the county of Down.

**DALBERG**, the name of an ancient German family of great renown. At every coronation of a German emperor a representative of the family received from him the dignity of "first knight of the empire." Several members of the family have been celebrated patrons of literature and art.

**DALBERGIA**, a genus of trees and shrubs named in honor of the Swedish botanist, Nicholas Dalberg. They are of the natural order *Leguminosae*, having pinnate leaves, and bearing a flat pod containing one to three seeds. All the species are natives of warm climates and several of them are valuable timber-trees, the *Dalbergia Sissoo* of Bengal being especially prized.

**DALE**, **ROBERT WILLIAM**, an English Congregational minister, born in London Dec. 1, 1829, and educated at Spring Hill College, Birmingham, and at the University of London. In 1853 he became associate pastor in the Congregational church at Carr's Lane, Birmingham, and in 1859 succeeded to the sole pastorate. For several years editor of the "Congregationalist," he delivered the Congregational Union lectures in 1873, and has taken a prominent part in the movements of the churches of his denomination in England during recent years. Mr. Dale has traveled in the East, and in 1877 visited America at the invitation of the theological faculty of Yale College to deliver the Lyman-Beecher lectures on preaching. On his return to England he published, in the "Nineteenth Century," his *Impressions of America*. He has been a frequent contributor to the English reviews; and is author of numerous works, among which are: *Week-day Sermons* (1867); *The Ten Commandments* (1871); *Nine Lectures on Preaching* (1877); and *Lectures on the Epistle to the Ephesians* (1882).

**DALECARLIA**, the län or county of Fahlun, formerly a province of Sweden. The Dalecarlians are celebrated for bravery and patriotism, especially for the part they took in freeing their country from the rule of Christian II of Denmark. As



a reward they are accorded special privileges by the king. Area, 12,127 square miles. Population, 175,927.

DALEITES, a name given to one or two congregations of Scotch Independents, followers of David Dale.

DALFSEN, a town in Holland, situated on the Vecht, four miles east of Zwolle. Population, 5,549.

DALHOUSIE, a seaport town of New Brunswick, situated at the mouth of the Restigouche, and capital of Restigouche county. It exports large quantities of fish and lumber. Population, 2,353.

DALIAS, a town of Spain, in the province of Almeria, about twenty miles from the city of that name, and four miles from the Mediterranean Sea. It is poorly built and subject to earthquakes. It has lead mines. The people are chiefly employed in mining, smelting and fishing. Population, 9,000.

DALKISSORE, a river of Bengal, rising in lat. 23° 30' N., and long. 86° 34' E. It has a southeasterly course of about 170 miles, emptying into the Hoogly at Diamond harbor.

DALL, CAROLINE WELLS, born in Boston, Mass., in 1822. She was a contributor to "The Liberty Bell" and in 1852 became corresponding editor of "The Una." She delivered a number of lectures, and published *Egypt's Place in History, Historical Pictures Retouched*, etc.

DALL, WILLIAM HEALY, son of Caroline Dall, born in Boston, Mass., Aug. 21, 1845. He held several positions on geological surveys, and had charge of the works of the Western Union telegraph expedition to Eastern Siberia in 1866. In 1884 he became paleontologist to the U. S. Coast Survey, and has made several expeditions to Alaska in their interests. He is also a member of many scientific societies, and has published numerous scientific papers.

DALLAS, the capital of Paulding county, Ga., the scene of a battle between Gen. Sherman and Gen. Johnston, in May, 1864.

DALLAS, capital of Polk county, Oreg., located on the Rickreal River.

DALLAS, a city of Texas, the metropolis of the northern portion of the State, county-seat of Dallas county, on the Trinity River, about one mile below the mouth of the West Fork. Although it was first settled in 1841, it has become one of the most important cities in the State. It is situated in the midst of a productive agricultural region, and has large grain elevators and commercial warehouses. It is an important railroad center, being at the crossing of the Houston and Texas with the Texas and Pacific Railways. It is abundantly supplied with good water, obtained from artesian wells; has gas-works, street railways and electric lighting systems. Its principal manufactures are flour, cotton seed oil, agricultural implements, cement, artificial stone, wagons and carriages. It also carries on an immense trade in cotton, grain, hides, etc. The Texas State Fair and Dallas Exposition buildings are located here, and cover eight acres of ground. Its educational interests are liberally provided for, and it is fully equipped with literary and benevolent institutions. The population in 1880 was 10,353; in 1890, 38,140.

DALLAS, ALEXANDER JAMES, statesman and author, born in the Island of Jamaica, June 21, 1759, died in Trenton, N. J., Jan. 14, 1817. He was the son of a Scotch physician, studied in Edinburgh and Westminster, read law in London, and then removed to Philadelphia, Pa., and practiced law. In 1791 he became secretary of the Commonwealth. He was editor of the "Columbian Magazine," and he also edited the laws of the State with

notes, and compiled *Reports of Cases* ruled and adjudged by the courts of the United States and Pennsylvania. In 1794 he was appointed Paymaster-General, and in 1796 Secretary of State; he was Secretary of the Treasury under President Madison in 1814. Mr. Dallas advised the establishment of a national bank, and a bill to this effect was passed, but vetoed by the President; in 1816, however, the President signed an act to incorporate such a bank, and treasury notes, which before were scarcely current, were sold at par, plus interest. In March, 1815, Dallas was obliged to discharge the duties of Secretary of War; the year following he died a few weeks after having retired from public service.

DALLAS, GEORGE MIFFLIN, statesman, born in Philadelphia, Pa., July 10, 1792, died there Dec. 31, 1864. He graduated at Princeton, studied law, and accompanied Albert Gallatin to Russia as private secretary. He assisted his father, when the latter was Secretary of the Treasury; practiced law in New York city; was solicitor of the U. S. bank, and in 1817 was appointed deputy attorney-general for Philadelphia county. In 1831 he was sent to the U. S. Senate. From 1833 to 1835 he was attorney-general of Pennsylvania, and in 1837 was minister to Russia. After two years he was recalled and resumed his legal practice. He was elected Vice-President in 1844, and was minister to England from 1856 to 1861.

DALLES CITY, capital of Wasco county, Oreg., located on the south bank of the Columbia River. It has a large woolen factory.

DALLES of the Columbia, a name given to a portion of the Columbia River. For a considerable distance above the stream is bounded by basaltic rocks, and at this point they suddenly confine the stream to about one-third its usual width, with perpendicular walls on either side. The river plunges violently through the chasm, which is but fifty-eight yards wide.

DALLES of the St. Louis, a series of rapids in the St. Louis River, extending about four miles over a bed of slate, near Duluth, Minn.

DALI' ONGARO, FRANCESCO, born at Odezzo, Italy, in 1808. He was a priest, but being suspended for preaching independent doctrine, he left the church and engaged in revolutionary journalism in Trieste, from which place he was expelled in 1847, and a year later was compelled to leave Italy altogether, and did not return until 1859. During the interim he was a contributor to Parisian journals. On his return to Italy he became professor of literature at Florence. He has published lyric poems, tales and dramas.

DALMANIA, a genus of trilobites. The best known species is *Dalmania limulurus* of the Niagara limestone.

DALMATICA, a long-sleeved robe formerly worn by the Greeks and Romans, and still worn by deacons in the Greek and Roman Catholic churches, though in a somewhat different form. It was originally of linen, but is now generally made of some heavy silk.

DALRIADA, the ancient name of a territory in Ireland now called "the route," the northern half of the county of Antrim. It signifies "the country of the race of Riada," an Irish chieftain of the 3d century. About 506 some of his descendants made a permanent settlement in Argyleshire in Albany, as Scotland was then called, founding the kingdom of "Dalriada in Albany." More than twenty kings of this state preceded Kenneth Mac-Alpine, who, in 843, united the Dalriads and Picts, and became the first king of Albany. About two centuries later it began to be known as Scotland.

**DALRYMPLE, ALEXANDER**, a younger brother of Lord Hailes, was born at New Hailes, near Edinburgh, in July 1737, died June 1808. In 1752 he entered the East India Company's service, but soon relinquished this appointment. Having become interested in the commerce of the Eastern Archipelago, he made a voyage of observation among the islands. He concluded a treaty with the Sultan at Sooloo, but being unsuccessful in securing the interest of home authorities his scheme proved a failure. In 1775 he was sent out to Madras as a member of council, and in 1779 appointed hydrographer to the East India Company. In 1795 the admiralty established a similar office and bestowed it on Dalrymple. This position he held until within a short period of his death. He left a valuable library, which was purchased by the admiralty.

**DALTON**, a railroad junction, capital of Whitfield county, Ga. It is surrounded by extensive mineral fields of iron, limestone, manganese, etc.; manufactures cotton, iron and leather, and has besides a large trade in fruit, grain, etc. It was the headquarters of the Confederate army under Gen. J. E. Johnston in 1864, and several battles were fought in the vicinity. At the beginning of Sherman's Atlanta campaign it was abandoned.

**DALTON**, a town of Berkshire county, Mass., on the Boston and Albany Railroad. It has important manufactories of machinery, paper, woollens, and cotton goods.

**DALTON-IN-FURNESS**, a town of England, in Lancashire. The ruins of Furness Abbey, founded by Stephen in 1127, are near Dalton. It has iron-works and iron-mines. Population, 13,350.

**DALTON, EDWARD BARRY**, born in Lowell, Mass., Sept. 21, 1834, died at Santa Barbara, Cal., May 13, 1872. He was a graduate of Harvard, served in the war from 1861 to 1865 as army surgeon, and became medical director of the 9th army corps. After the war he was appointed sanitary superintendent of the New York board of health, which office he held till 1869. He originated the city ambulance system now in use.

**DALTONISM**, a want of sensibility in the eye to differences of color; color-blindness. It was so called because John Dalton, a celebrated chemist, suffered from it. See *Britannica*, Vol. VI, p. 784.

**DALY, AUGUSTIN**, dramatist and theatrical manager, born in North Carolina in 1838. His first decidedly successful literary work was *Leah*, produced in 1862, though a farce. *A Bachelor's Wardrobe*, previously written, had met with favor. Mr. Daly's original dramatic works and his adaptations are numerous and clever.

**DALY, CHARLES PATRICK**, born in New York city, Oct. 13, 1816. He went to sea before the mast, and on his return became a mechanic's apprentice. Afterwards he studied and practiced law, was elected to the legislature, became justice of common pleas court, judge and chief justice, 1871-86. He is the author of legal, biographical and scientific papers.

**DAMAGES**. See *Britannica*, Vol. VI, pp. 787-89.

**DAMANHOOR**, capital of the province of Bahreh, in Lower Egypt. It has manufactories of wool and cotton. Population, 10,000.

**DAMAR**, a town of Yemen, Arabia, situated about 120 miles north-northwest of Aden. It has a college, and is the residence of a governor. It contains about 5,000 houses.

**DAMASCUS BLADES**, a name given to sword-blades made of Damask steel, having a peculiar watered or streaked appearance. They were originally made at Damascus in Syria, and have been

famous since the time of the Crusades for their beauty and excellent temper. It is said that bars of iron could be cut with them, and that, being bent into a hoop, they would resume their original shape without injury. See *Britannica*, Vol. VI, p. 793.

**DAMASTES**, a Greek historian, about B. C. 440. Several works are ascribed to him, the few remaining fragments of which are collected in Müller's *Fragm. Histor. Græcæ*.

**DAMBOOL**, a village of Ceylon, remarkable for a vast rock-temple of the Buddhists. It is partly artificial, and was constructed about 100 B. C. Among a profusion of sculpture it contains an enormous image of Buddha, hewn from the rock.

**DAME**, formerly a title of honor given to high-born ladies to distinguish them from the wives of citizens. In France the Virgin Mary was called *Notre Dame* (our mistress), and madame was the sole title of the wife of the king's eldest brother. Though little used by the English, it is now applied to married women of all classes. Madame, shortened to madam, is a respectful form of address.

**DAME'S VIOLET** (*Hesperis*), a genus of plants of the natural order *Cruciferae*, of which there are several species, natives chiefly of the Middle and South of Europe. One only, the common dame's violet, or white rocket (*H. matronalis*), is found in Britain. The night rocket (*H. tristis*) is a favorite flower in Germany.

**DAMIANI PIETRO**, or **SAINT PETER DAMIAN**, born at Ravenna in 1007, was made cardinal-bishop of Ostia in 1057. In morals and intellect he was the superior of most men of his time, and he is honored as one of the doctors of the church. He originated a system of penance which became very popular; was a voluminous writer, and opposed simony and other corrupt practices of the clergy.

**DAMIANISTS**, a religious sect of the sixth century, sometimes called Angelists. They were followers of Damianus of Alexandria.

**DAMIANUS**, a sophist and rhetorician of Ephesus, of whom an account is given by Philostratus. He was a successful teacher of rhetoric, a man of wealth and liberality. He erected a fine portico at Ephesus.

**DAMM, CHRISTIAN TOBIAS**, a Greek scholar and theologian, born near Leipsic in 1699. He made a translation of the New Testament and of the works of several Greek authors. His *Homeric and Pindaric Lexicon*, first published in 1765, was his principal work, and the one by which he is now known among scholars.

**DAMMUDAH**, a river of India, rises in Ramgurbh, Bengal, about lat. 23° 55' N., and long. 84° 58' E.; pursues a southeasterly course of about 350 miles, and empties into the Hoogly from the right.

**DAMO**, a daughter of Pythagoras. His memoirs were left in her care, and by her transmitted to her daughter Ditale.

**DAMON**, a musician and sophist of Athens. Plato speaks of him as a person of distinguished abilities, and Plutarch credits him with the invention of a form of the Lydian melody. He was teacher and adviser of Pericles.

**DAMOPHON**, a statuary of Messene, about 370 B. C. His works were chiefly statues of Parian marble and of wood. Among the most important are mentioned a statue of Lucina, one of the mother of the gods, of Mercury and of Venus.

**DAMOPHYLE**, a female Greek poet, a follower of Sappho. None of her works are in existence, and very little more is known of her than that she was a Pamphylian by birth and lived about 610 B. C.



She instructed young women, and composed hymns to Artemis, which were sung at Perga.

**DAMPER**, a door or valve used to diminish the aperture of a chimney, or air-flue for the purpose of checking combustion. The damper of a piano-forte is a padded drop which, after a key is struck and the finger lifted, immediately falls upon the string and stops vibration, giving clearness to the sound. Damper is also a name given in the Australian bush to a kind of unleavened bread made of wheat-flour and baked among the ashes.

**DAMPIER ARCHIPELAGO AND STRAIT** take their name from the noted navigator and bucaner, William Dampier. The strait is 35 miles in width.

**DAMPING OFF**, in horticulture, the death of plants from excess of moisture in the soil and atmosphere, to which young seedlings are especially liable.

**DAMPS**, in mining, the name given to the gaseous products eliminated in wells, coal mines, etc. There are two kinds: *choke-damp*, mainly composed of carbonic acid, and so called from its extinguishing flame and life; and *fire-damp*, consisting principally of light carbureted hydrogen, and so called from its tendency to explode when mixed with atmospheric air and brought into contact with flame.

**DAMROSCH, DR. LEOPOLD** (1832-85), composer, conductor, and violinist; founder of German opera in the United States, and of the Oratorio and Symphony Societies of New York, was born in Posen, Germany, in 1832, and developed a talent for music at an early age. He studied medicine, however, at the wish of his parents, and took his degree in Berlin in 1854. In 1856 he made his first public appearance as a violin virtuoso. In the same year he became Liszt's concert-master at Weimar, and while there became intimate with Bülow, Raff, Tausig, Lassen, Cornelius, and other celebrities. From 1858 to 1871 he occupied positions of honor in Breslau, and made frequent concert tours through Germany as a solo violinist. In 1871 he accepted a call from the Arion Society of New York to become its conductor, and made his first public appearance in America as a conductor, composer, and violinist. In 1873 he founded the Oratorio Society, the foremost choral society in the United States, and in 1878 the Symphony Society. During one season he also conducted the concerts of the Philharmonic Society. His last great work, and the one that cost him his life, was the establishment of German opera in New York. The enormous amount of work involved in the leadership of these great societies undermined his health so that he became an easy prey to pneumonia, and died suddenly Feb. 15, 1885. Dr. Damrosch was married in Breslau, to Helena von Heimbürg, a well-known soprano singer, and had two sons and three daughters. He was a man of refined intellectual culture and sound scholarship, the most untiring energy, and much personal magnetism. His literary attainments and oratorical brilliancy were remarkable, and his taste in all matters was broad and catholic. The service he rendered music in New York and the whole country is hardly to be estimated. He came at a time when a better taste in musical matters was awakening, and he was able to guide the course of affairs into the broadest and deepest channel, and by his enthusiasm he gave an impetus to music that will not cease to be felt. "He did a great and noble work, and he did it in a great and noble way." As a composer Dr. Damrosch ranks high. Among his works are an opera, a symphony, four violin concertos, two large works orchestra, solos and chorus, twelve books of songs, several works for the violin, and some large works for male chorus.

**DAMROSCH, WALTER JOHN**, son of the foregoing, born in Breslau, Prussia, in 1862, and removed with his father's family to the United States at the age of nine. In his childhood his improvisations on the piano were remarkable. He studied under his father, Max Pinner, Rischbieter, Hauptmann, and Hans von Bülow.

At the age of nineteen he became conductor of the Harmonic Society of Newark, N. J., and produced successfully a number of important works. At the age of twenty-three he was called to fill the places left vacant by the death of his father, and proved himself so able a leader that he was elected the following year to the permanent leadership of the Oratorio and Symphony Societies, and was also made assistant musical director of the German opera.

As a conductor Mr. Damrosch is eminently successful. Although still so young he has brought out many of the greatest works, such as Liszt's *Christus*, the whole of Parsifal, arranged for concert performance, *Berlioz' Damnation de Faust*, *Messe des Morts*, and *Te Deum*, and Grell's *Missa Solemnis*. He is a strict disciplinarian and indefatigable in the performance of duty. While exerting a strong personal magnetism over the members of his societies he does not depend upon that to carry through a performance, but is exacting in rehearsals, insisting upon a devotion from each individual member equal to his own. He is particularly at home in the Oratorio Society, and has brought that organization to a state of efficiency almost unrivaled in any country.

Among Mr. Damrosch's services to music not the least is the pioneer work he has done in the lecture field. In 1891 he had delivered over two hundred lectures on musical subjects, illustrating them upon the piano. The Wagner Music Dramas have been interpreted in this manner, and the explanatory lectures on the works performed by the Symphony Society have done a great educational work. Through his influence, too, New York secured its permanent orchestra (of which he is leader), and the Music Hall, given by Andrew Carnegie, which was opened with a music festival in May, 1891.

Personally Mr. Damrosch is very popular. His genial and extremely sympathetic nature has gained for him many friends, while his brilliant attainments have compelled general admiration. Notwithstanding his remarkable success, he remains an earnest and hard-working student, and it is safe to predict for him a great future. As a composer he is not yet widely known, but a number of his works have been performed in various cities. In 1890 he was married to Margaret Blaine, daughter of James G. Blaine, Secretary of State.

**DAMSON**, a rather small oval fruit, variety of the common plum. There are many sub-varieties bearing fruit of different colors—black, dark purple, yellow, bluish, etc. The name is a corruption of *Damascene*, from Damascus.

**DANA, CHARLES A.**, editor of the "Harbinger," connected with the "New York Tribune," and since 1868 editor of the "Sun," was Assistant-Secretary of War 1863-64; and is one of the editors of the *New American Cyclopaedia*.

**DANA, FRANCIS, LL.D.**, American statesman and jurist, born at Charlestown, Mass., June 13, 1743, died at Cambridge, April 25, 1811. He graduated at Harvard College in 1762, and was admitted to the bar in 1767. He was chosen member of the first provincial congress of Massachusetts in 1774; member of the council which acted as the executive of Massachusetts, 1776-80, and delegate to the Continental Congress in 1777 and 1778. Appointed minister to Russia in 1781, he returned to America in

1783, and was again elected to Congress. In 1785 Governor Hancock appointed him a justice of the supreme court of Massachusetts, and in 1791 he was appointed chief justice, which position he held for fifteen years. After his retirement he devoted himself chiefly to enterprises for the benefit of the public, and was one of the founders of the American Academy of Arts and Sciences.

DANA, JAMES, born at Cambridge, Mass., May 11, 1735, died in New Haven, Conn., Aug. 18, 1812. He graduated at Harvard College and became a Congregational minister; was pastor of the first church at New Haven for sixteen years.

DANA, JAMES DWIGHT, born at Utica, N. Y., Feb. 12, 1813. He graduated at Yale in 1833 and became successively instructor in mathematics to midshipmen, assistant in chemistry to Professor Silliman, and Government mineralogist and geologist. He accompanied Captain Wilkes to the Southern and Pacific Oceans in 1838, and Mr. Dana returned about four years later, having been wrecked at the mouth of the Columbia River. About 1850 he became assistant editor and subsequently the senior editor of the "American Journal of Science and Art," and the same year was appointed Silliman professor of natural history and geology in Yale College.

DANA, RICHARD HENRY, American poet and essayist, born in Cambridge, Mass., Nov. 15, 1787, died in Boston, Feb. 2, 1879. He was the son of Francis Dana; was educated at Harvard; studied law at Newport, R. I.; was admitted to the bar of Massachusetts in 1811, and engaged in politics. He was associated in the editing of the "North American Review" (1818-21). In this periodical appeared some of his first prose articles. He was an invalid for many years, but retained his intellectual vigor to the age of ninety-two.

DANA, RICHARD HENRY, JR., LL.D., lawyer and author, born at Cambridge, Mass., 1815, died in Rome, Jan. 7, 1882. He entered Harvard in 1832, but did not graduate until 1837, his college course being interfered with by an affection of the eyes. Unable to study, he shipped as a common sailor on the ship *Pilgrim* for a voyage round Cape Horn, and the record of his adventures appeared in his book, *Two Years Before the Mast*. On his return he studied law, was admitted to the bar of Massachusetts, and soon became eminent. He wrote on legal subjects and accounts of travel, taking special interest in seamen and laws referring to them. Harvard gave him the degree of LL.D. in 1866.

DANAIDE, an hydraulic machine of great ingenuity, whose name was suggested by the Danaides. It consists of a vertical axis with a cone attached, the latter being perforated longitudinally with holes. Water enters in a jet at the top of the cone, and by its momentum imparts motion to the axis.

DANBURY, a city of Connecticut, and one of the county-seats of Fairfield county (see *Britannica*, Vol. VI, p. 797). Danbury is chiefly noted for its manufactures of hats, an industry which has flourished there for more than a century. It has also manufactures of sewing-machines, boots and shoes, shirts, etc. There are also iron foundries, extensive water-works, a town farm for the indigent, a cemetery of remarkable beauty, a high school, several graded schools, and a fine public library. The population of the city in 1880 was about 8,000; of the township, 11,666. In 1890 the population of the city was 19,385.

DANBY, THOMAS O., EARL OF (1631-1712), minister and lord treasurer of Charles II. Being charged with treason in 1678, he was imprisoned in the Tower for five years, but was released by William III, and made president of the council. See *Britannica*, Vol. VIII, pp. 349-50.

DANCE OF DEATH, a name given to a certain class of allegorical representations illustrative of the universal power of death, and dating from the 14th century. The drama was simply constructed, consisting of short dialogues between death and a number of followers, and was enacted in or near churches by religious orders. After a time an illustration was attached to each strophe, and these eventually became the chief point of interest. Being transferred from the quiet convent to more public places they gave a new impulse to popular art, and series are to be found treated in painting, sculpture, and tapestry all over the continent (see *Britannica*, Vol. V, p. 104). The more ancient name was *Dance Macabre*.

DANCETTE, one of the lines of partition in heraldry, which differs from indented only in the greater size of the notches.

DANCING MANIA, a form of epidemic disorder allied to hysteria, evidently resulting from imitative emotions acting upon susceptible subjects, influenced by a craving for sympathy or notoriety. Undoubtedly imposture has entered considerably into all the epidemic forms of the dancing mania.

DANE, NATHAN, LL.D. (1752-1835), a popular lawyer of Massachusetts. He served in the Continental Congress from 1785 to 1788, and framed the ordinance for the Northwest Territory, inserting a clause prohibiting slavery; he was United States Senator from 1794 to 1798, and he established the Dane professorship of law at Harvard.

DANEBROG, "the Danish banner," the second in dignity of the Danish orders, instituted by King Waldemar in 1219, as a sort of glorification of the flag. The decoration consists of a cross of gold *patée*, enameled with white, suspended by a white ribbon embroidered with red.

DANEGLT, or DANEGOLD, a tribute levied on every hide of land by the Anglo-Saxons for the purpose of meeting the outlay requisite for defending the country against the Danes. The tax was continued after the Conquest, as one of the rights of the crown, till the time of Stephen. See *Britannica*, Vol. VIII, pp. 294, 567.

DANENHOWER, JOHN WILSON, Arctic explorer, born in Chicago, Ill., Sept. 30, 1849. He graduated from the United States Naval Academy in 1870; served on the *Portsmouth* on a surveying expedition in the Northern Pacific; took part in subduing an insurrection at Honolulu, Hawaii, in 1873; served on board the *Vandalia* when Gen. Grant visited Egypt, and in 1878 joined the *Jeannette*, which was sailing from Havre, France, on an Arctic exploration. The expedition left San Francisco harbor July 8, 1879; sailed through Bering Straits, and cruised in the Arctic Ocean until the steamer was crushed in the ice. The crew marched for ninety-five days over the ice, dragging their boats, then embarked in the open waters; but a storm arose and separated the boats. Lieut. Danenhower's boat reached the Lena delta, but the other crews perished. With his crew he arrived in America in June, 1882. He published *The Narrative of the Jeannette*. He died in 1887.

DANIEL, BOOK OF. See *Britannica*, Vol. VI, pp. 803-07.

DANIELSONVILLE, a town of Connecticut, situated on the Quinnebaug River, about twenty-five miles north of Norwich. It contains a number of extensive cotton-mills and several shoe manufactories.

DANITES, a secret organization among the Mormons, whose members are believed to have been the authors of the Mountain Meadow massacre, and to have committed other atrocities.



**DANKALI**, an independent state of Abyssinia, extending along the southwest border of the Red Sea. It is a sterile territory, being almost destitute of water. The heat is excessive, often reaching 110° F. The population of about 70,000 is Arabic, and the people are treacherous, indolent and cruel.

**DANSVILLE**, a town of New York, situated at the head of the Genesee Valley. It is an important railroad center, and contains a variety of manufactories, a seminary, and a hygienic institute.

**DANTE**. See *Britannica*, Vol. VI; pp. 809-15.

**DANVERS**, a town of Massachusetts, about twenty miles north of Boston. It contains extensive manufactories of shoes, iron, brick, carpets, and lumber, and is the seat of a State insane asylum.

**DANVILLE**, a city of Illinois, and county-seat of Vermilion county (see *Britannica*, Vol. VI, p. 820). Danville is an important railroad center, on the Chicago, Danville and Vincennes, the Paris and Danville, the Wabash, the Indianapolis, Bloomington and Western, and the Evansville, Terre Haute and Chicago Railroads. It has varied manufactories, and is largely engaged in the mining and shipment of coal, which crops out in abundant quantities from the bluffs in the immediate vicinity. The car and machine shops of the Chicago, Danville and Vincennes Railroad are located here. Population in 1880, 7,733; in 1890, 11,528.

**DANVILLE**, a city of Kentucky, county-seat of Boyle county, about a hundred miles southeast of Louisville. It is the seat of Centre College, the Southern Collegiate Institute, Danville Theological Seminary, and Caldwell Female Institute, and contains a State asylum for the deaf and dumb.

**DANVILLE**, a city of Pennsylvania, county-seat of Montour county, situated on the north branch of the Susquehanna, fifty miles southwest of Wilkes Barre. See *Britannica*, Vol. VI, p. 820.

**DANVILLE**, a flourishing city of Pittsylvania county, Virginia, situated on the Dan River Falls, 65 miles south of Lynchburg. It is a railroad center on the Richmond and Danville Railroad, and the terminus of the Virginia Midland Railroad. It is an important tobacco market, being in the center of the fine yellow tobacco section. It is estimated that 25,000,000 pounds of tobacco have been sold at Danville in a year. It has superior educational advantages, and is the seat of the Danville Male Academy, the Danville Female Academy, and the Roanoke Female College. The population in 1880 was 7,526; in 1890, 10,785.

**DARAGUNJ**, an Indian town, in the British district of Allahabad, and connected with the town of the latter name by a ferry. Here the bed of the Ganges is about one mile wide, and in the dry season two-thirds of the width is covered with wet sand and mud, rendering the passage across it difficult.

**DARBUNG**, a mountain torrent of Bussaher, Hindoostan. It rises about 15,000 feet above sea-level, and, after flowing for twenty-seven miles, is lost in the Sutlej, the most easterly of the five rivers of the Punjab. A wooden bridge about 33 feet in length crosses this river about seven miles above its junction, at a descent of 6,000 feet from its source, the banks of the river, still farther up, being bordered by several villages. Its source, which consists of fields of snow and ice half concealed beneath stones and rubbish, is described as a scene of terrific desolation.

**DARBY, JOHN NELSON**, an English theologian, born at Westminster, London, Nov. 18, 1800, died at Bournemouth, April 9, 1882. He was educated

at Trinity College, Dublin; became a barrister, and subsequently took orders in the church of England. Becoming interested in doctrines advocated by Mr. Edward Cronin, of Dublin, Mr. Darby published a pamphlet *On the Nature and Unity of the Church of Christ* (1828), which had the effect of spreading these views. In 1832 he withdrew from the Established Church, and going to Plymouth there formed and became leader of a sect of Christians known as Plymouth Brethren, or Darbyites. In 1838 he went to Switzerland, where he labored with considerable success, and here he prepared and issued a *Synopsis of the Books of the Bible*, in five volumes. He continued to labor much on the Continent of Europe, especially in France, Switzerland, Spain and Italy; visited Canada in 1860, and ten years later extended his work into the United States. In 1876 he visited Australia and New Zealand. His writings comprise controversial, doctrinal, and devotional treatises, but he gave most prominence to the exposition of the Scriptures. He translated the Bible into German, and the New Testament into French.

**DARCET, JEAN P. J.** (1777-1844), a French chemist, who improved the manufacture of gunpowder and the composition of bronze and steel. His father directed the manufacture of porcelain at Sèvres, and proved that the diamond was combustible.

**DARDANELLE**, a town of Arkansas, situated on the Arkansas River, about eighty miles above Little Rock. It is an important transportation point for cotton and other products, and contains a variety of manufactories.

**DARGAN, WILLIAM** (1800-67), born in County Carlow, Ireland, where his father had a large farm. He was contractor for the Dublin and Kingston Railroad, the first built in Ireland, and subsequently he connected himself with most of the important undertakings of a similar character in that country, as the constructing of canals, embankments, tunnels, and railways, and he also figured prominently as a railway stockholder, a steamboat proprietor, a farmer and flax-grower. He planned the Industrial Exhibition of Dublin (1853), which was opened by the lord-lieutenant, May 12, 1853, and was visited by the Queen and Prince Albert, when the honor of knighthood was offered to him, but declined.

**DARIEN**, a town of Georgia, county-seat of McIntosh county, and a port of entry; situated on the Altamaha River, about 60 miles south of Savannah. It is an important shipping point for the exportation of lumber.

**DARK AGES**, the period between the fall of the Roman Empire and the revival of letters in the 15th century; or, according to some, dating from the invasion of France by Clovis in 486 to the invasion of Naples by Charles VIII in 1495, a period of about 1000 years.

**DARK DAYS**, in history, days when, from different causes, the sun has been so darkened that artificial light has been indispensable in transacting business. A phenomenon of this kind occurred in New England, May 19, 1780, during the session of the Connecticut legislature at Hartford, which occasioned a proposition to adjourn. The years 295 B. C. and A. D. 252, 746, and 775 are notable for the occurrence of remarkable dark days, and the account of the darkness which was "over all the earth" during the three hours of the crucifixion is familiar to all. In England, a dark day occurred in January, 1807, and another October 21, 1816, and on the 19th of October, 1762, one occurred in Detroit. A remarkable instance of darkness of brief duration took place in Canada, Oct. 16, 1863.

London, usually enveloped in fog and smoke, has been greatly subject to dark days, among which may be mentioned May 10, 1812; December 27, 28, and 29, 1813, and November 27, 1816. There have been several causes given for these phenomena, as vapors generated by internal heat, smoke from meteors, volcanic smoke and ashes, terrestrial dust from deserts, the smoke of burning forests, cosmical dust drifting from outer space into the atmosphere, ordinary clouds reinforced by smoke from furnaces and factories, etc., the last of which appears to most nearly meet all the conditions, especially with the additional idea of a double rather than a single stratum of clouds; each suggestion, however, has been made the subject of learned discussion.

DARKHAN, MT., a Mongolian granite mountain of great height; an annual meeting is held here at the monument of Genghis Khan, whom the Mongolians thus honor.

DARLEY, FELIX OCTAVIUS CARR, born in Philadelphia, Pa., June 23, 1822, died in Claymont, Del., March 27, 1888. He became an artist, although in his youth he engaged in mercantile pursuits, and was employed by Philadelphia publishing houses as an illustrator. He attained celebrity in this department. Among the works which he illustrated are the novels of Cooper and Dickens, some of Longfellow's poems, Irving's *Sketch Book* and *Rip Van Winkle*, and Sylvester Judd's *Margaret*.

DARLING, GRACE, born in Yorkshire, England, in 1815, died of consumption in 1842. She was the daughter of William Darling, light-house-keeper on Longstone, one of the Farne Islands. During a storm on the morning of September 7, 1838, the *Porfarrowshire*, with sixty-three persons on board, was wrecked among the Farne Islands, and Darling, at the solicitation of his daughter, put off for the wreck, accompanied by her. Through their united efforts they reached and rescued the nine remaining persons.

DARLING, HENRY, D. D., LL. D., born in Reading, Pa., Dec. 27, 1823. He graduated at Amherst (1842), studied theology at Union and Auburn seminaries, and, after being ordained to the Presbyterian church, was settled as pastor at Columbia, N. Y. He subsequently occupied pastorates at Vernon, New York, Clinton Street church, Philadelphia, and the 4th Presbyterian church of Albany. From here he was called in 1881 to the presidency of Hamilton College at Clinton, N. Y., and still continues in that office (1891). In the same year he presided over the Presbyterian general assembly. He is the author of numerous pamphlets and magazine articles, and several books. He died in 1891.

DARLINGTON, a city of Wisconsin, county-seat of La Fayette county, situated on the Pecatonica River, about fifty miles southwest of Madison. It contains a number of manufactories, and is the center of an extensive trade in grain and livestock.

DARLINGTON, WILLIAM, an American scientist, born in Birmingham, Pa., April 28, 1782, died in West Chester, April 23, 1863. He studied medicine, graduated from the Pennsylvania University in 1804, and sailed for India as ship's surgeon. His *Letters from Calcutta* describe the trip. On his return to America he engaged in politics; raised a company of soldiers for the war of 1812; founded a society of natural history, published *Flora Cestrica* (a description and classification of every plant known in Chester county), and served two terms in Congress. He was a member of many learned societies of America and Europe. A most remarkable species of pitcher plant found in California was named in his honor. Yale, in 1848, conferred

on him the degree of LL.D., and Dickinson College in 1855 that of Doctor of Physical Science.

DARTMOOR. See under DEVONSHIRE, Britannica, Vol. VII, pp. 139-43.

DARTMOUTH, a town of Nova Scotia, connected by ferry with Halifax. It contains a number of manufactories, a provincial lunatic asylum, and many handsome residences.

DARTMOUTH COLLEGE. See COLLEGES, in these Revisions and Additions.

D'ARUSMONT, FRANCES (Fanny Wright), a reformer and lecturer on social, religious and political questions; born in Scotland in 1795, died in Cincinnati in 1852. She was especially known through her not very successful experiments to elevate the colored race.

DARWIN, CHARLES ROBERT (1809-82), an English naturalist, born at Shrewsbury, Feb. 12, 1809. He was educated at Shrewsbury grammar-school, Edinburgh University, and Christ's College, Cambridge. It was at the latter institution that his biological studies seriously began. On December 27, 1831, shortly after taking his degree of B. A., he sailed as naturalist to the expedition of H. M. S. *Beagle* for a scientific survey of South American waters, and did not return to England till October 2, 1836. It was during this long expedition that he obtained that intimate knowledge of the fauna, flora, and geological conditions of many tropical, sub-tropical, and temperate climates which so admirably equipped him for the great work he was afterwards to perform. On his return to England he formed the friendship of several scientific leaders, through whose influence he was appointed secretary of the Geological Society in 1838. In 1839 he was elected to the Royal Society, and in the early part of this year his marriage with Miss Wedgwood took place. In the same year he published his *Journal of Researches Into the Geology and Natural History of the Various Countries Visited by H. M. S. Beagle*. From 1840 to 1843 Darwin was occupied with the publication of the *Zoology of the Voyage of the Beagle*, under government auspices. In 1842 appeared his work on *The Structure and Distribution of Coral Reefs*; in 1844, *Geological Observations on Volcanic Islands*; and in 1846, *Geological Observations on South America*. These works placed him at once in the front rank of contemporary scientific thinkers. Three years after his marriage Darwin settled at Down, in Kent, where the remainder of his life was passed, private means enabling him to devote himself unremittingly to the pursuit of science. In 1858 Darwin set to work seriously to condense his vast mass of notes and put into shape his great work *The Origin of Species by Means of Natural Selection*, published in November, 1859. From the day of its publication he worked at a great series of supplemental treatises. Of these the *Descent of Man* (1871) has been hardly less famous than the *Origin of Species*. He was author of a number of later works, but it is as the great leader of evolutionary biology that Darwin will be mainly remembered. Though not himself the originator of the hypothesis, he was undoubtedly the first to gain for that conception a wide acceptance among biological experts. He died April 19, 1882, and was buried with unusual honors in Westminster Abbey.

DARWIN, GEORGE HOWARD, son of Charles Robert, born in 1846. In 1870 he took part in the eclipse expedition to Sicily. He became a fellow of the Royal Society in 1879; since which time his labors have been mainly directed to investigation in physical astronomy. In 1882 he assisted in the revision of Thomson and Tait's *Natural Philosophy*. He became professor of astronomy and experi-



mental philosophy at Cambridge in 1883. Among his published works is a life of his father.

**DARWINISM.** See *Britannica*, Vol. VIII, p. 769; and Vol. XXII, p. 219.

**DASENT, SIR GEORGE WEBBE**, an English author, born in 1820 at St. Vincent in the West Indies, of which island his father was attorney-general. He was educated at Westminster School and King's College, London, and at Magdalen College, Oxford; was called to the bar in 1852, in which year also he received the degree of D.C.L. An accomplished linguist, he had frequently acted as examiner in English and modern languages for civil service appointments when in 1870 he was appointed a civil service commissioner. In 1876 he was knighted for public service. Dasent published a translation of *The Prose, or Younger Edda* (1842); *Popular Tales from the Norse* (1859), and *Tales from the Fjeld* (1874), both from the Norwegian of Asbjørnsen; translations from the Icelandic of the *Saga of Burnt Njal* (1861), and the *Story of Gísli, the Outlaw* (1866). His introduction to Asbjørnsen's *Popular Tales* is an admirable exposition of the Aryan theory of story transmission. He has also written several novels.

**DATAMES**, a Persian general, who successfully quelled a confederate revolt, but subsequently losing favor with Artaxerxes was betrayed and assassinated, 362 B. C. See *Britannica*, Vol. XVIII, p. 579.

**DATE PLUM**, a genus of plants of the order *Ebenaceæ*. The trees are deciduous with a globose berry fruit, and grow in a warm or temperate climate. Some species produce ironwood, which is a hard timber, and the black-heart wood of others is ebony. The common date plum or pishamin, although a native of the coasts of the Caspian Sea, Mauritania, etc., is naturalized and cultivated in Southern Europe, and is also called the European lotus and the date of Trebizond. It is a tree growing from 20 to 40 feet high, having shining oblong leaves; the small flowers are reddish-white; the fruit, usually the size of a cherry, grows larger in favorable climates, and is then sweet and astringent and yellow in color. When over-ripe it is eaten like the medlar, or is used for preserves. One species, known as the Virginia date plum, and found in the Southern States, bears an edible fruit of a reddish color.

**DATISCEÆÆ**, a small natural order of plants, allied to *Begoniaceæ*, and consisting of herbs and trees, mostly found in the temperate regions of the Northern hemisphere. *Datisca cannabina*, a plant much resembling hemp in its general appearance, a native of Crete, possesses very marked tonic properties. It contains also an amylicaceous substance, called *datiscin*, resembling *inulin*. It affords a yellow dye.

**DAUBER**, the name given to a mud-wasp whose nest is built in successive clay-cells, in each of which it stores live spiders and then deposits an egg, and when the grub is hatched it feeds upon the spiders till it goes into the pupa state, at which stage, having become strong enough to burst its cocoon, it gnaws through the walls of its cell.

**DAUDET, ALPHONSE**, a French dramatist and novelist, born at Nîmes, May 13, 1840, and educated at the Lyons Lycée. At the age of seventeen he went to Paris, where he secured an appointment as clerk or private secretary in the office of the Duke of Morny. M. Daudet's literary efforts began with poetry, and his first book, published in 1858, was entitled *Les Amoureuses*. He devoted some—not too successful—years of experiment to theatrical work, writing by himself or with a collaborator, *La Dernière Idole* (1862); *L'Éillet Blanc* (1865); *Le Frère Aîné* (1868); *Le Sacrifice* (1869);

*Lise Tavernier*, and *L'Arlésienne* (1872). He contributed to many journals, especially "Figaro," and in this form appeared some of his best work, the *Lettres de Mon Moulin* (collected 1869); *Robert Helmont* (1871); the *Contes du Lundi*, and others. It was not till many years after his literary beginnings that M. Daudet adopted the style which has made him famous. He sketched something of the kind in *Le Petit Chose* (1868), a story founded on his own childhood; the quality is still further developed in *Jack* (1873), and the publication of *Fromont Jeune et Risler Aîné* (1874) established his reputation. These have been followed by *Le Nabob* (1877), a caricature of well-known personages under the Empire; *Numa Roumestan* (1882); *L'Évangéliste* (1883); *Sapho* (1884); and *L'Immortel* (1888). Daudet is generally admitted to be one of the most powerful writers of the present day. His wife, *Madame Daudet*, is a lady of talent, who is understood to have rendered him much assistance in his literary work. She has contributed literary articles and criticisms to various journals.

**DAUDET, ERNEST**, a French author, brother of Alphonse, born at Nîmes, May 31, 1837, removed to Paris in 1857. For a time in the employment of M. de Morny, he became successively president of the Legislative Assembly, editorial secretary of the proceedings of the Assembly, and chief clerk of the Senate. While occupying these positions he was a constant contributor to various journals, and in 1873 he was appointed director of the "Journal Officiel." Since 1877 he has been chief editor of "L'Estafette." He is author of numerous novels, of work on the political questions of the day, and some of his later works have dealt with matters of history. *L'Histoire des Conspirations Royalistes du Midi sous la Révolution* (1881) has been crowned by the French Academy and a prize granted to the author.

**DAUMER, GEORGE FRIEDRICH**, a German poet and philosopher, born at Nuremberg, March 5, 1800, died at Würzburg Dec. 14, 1875. He studied at the gymnasium of his native city, took the courses in divinity and philosophy at Erlangen, and was subsequently professor in the gymnasium of Nuremberg. Abandoning the pietism of his student days, he passed through Schelling's philosophy to a position of bitter antagonism to Christianity; but in 1859 he joined the Ultramontane party and became one of its foremost champions. His many philosophical writings reflect his varying positions. His poetical works, especially *Mahomet* (1848) and the *Liederbluten des Hafis*, two graceful imitations of Persian poetry, have gained a high reputation.

**DAUNG**, a tract of land in the presidency of Bombay, area 950 square miles. It is composed of several unimportant states under the general government of the Rajah of Daung. Population, 70,300.

**DAUVRAY, HELEN**, an actress, born in San Francisco, Cal., Feb. 14, 1859. As a child she played in *Uncle Tom's Cabin*, *Richard III*, *The Scarlet Letter*, *Fidela*, *No Name*, *Katy Did*, in many different States of America, in Australia, and in France. She recently married John M. Ward, president of the Brooklyn Base Ball Club.

**DAVENPORT**, flourishing city of Iowa, and county-seat of Scott county (see *Britannica*, Vol. VI, p. 836). Davenport is on the Chicago, Rock Island and Pacific Railroad, and is the southern terminus of the Davenport and St. Paul Railroad. It is connected with eastern cities by other railroads, terminating on the opposite or eastern bank of the Mississippi River. It has extensive manufacturing of carriages, farming implements, woolen goods, cars, furniture, lumber, flour, etc., and has

high schools, a normal school, a convent, the Academy of the Immaculate Conception, the Catholic Seminary of St. Charles Borromeo, a well-endowed Catholic hospital, and a large public library. It is also the seat of Griswold College (Protestant Episcopal), which was founded in 1859. Davenport is an important depot for the shipment of grain. On the other side of the river, opposite the city, is Rock Island, a beautiful island several miles in length, owned by the United States government. Rock Island is the site of a United States arsenal and military headquarters and is connected with Davenport by a notable wrought-iron bridge, costing \$1,000,000. Population of Davenport in 1880, 21,831; in 1890, 25,161.

DAVENPORT, ABRAHAM, great grandson of John Davenport, one of the founders of New Haven, born in Stamford, Conn., in 1715, died there Nov. 20, 1789. He graduated at Yale, practiced law, and during the Revolution was a staunch and generous patriot. He was a member of the council in Hartford on the "dark day" of 1780, and when it was suggested that it might be the Judgment-day, and that the session would better adjourn, he said: "That day is either at hand or it is not; if it is not, there is no cause for adjournment; if it is, I choose to be found doing my duty." I wish, therefore, that candles may be brought."

DAVENPORT, EDWARD LOOMIS, an American actor, born in Boston, Mass., Nov. 15, 1814, died in Canton, Pa., Sept. 1, 1877. As an actor he was equally good in tragedy and comedy. His *début* was at Providence, R. I., when he appeared as Parson Will in *A New Way to Pay Old Debts*, Junius Brutus Booth taking the role of Sir Giles Overreach. He achieved success in Philadelphia, New York, Boston and in England, becoming very popular in London.

DAVENPORT, FANNY ELIZABETH VINING, born in London, July 6, 1829, the daughter of Frederick Vining, manager of the Haymarket Theater. When three years old she began her dramatic career, acting in baby parts. After a few years at school she returned to the stage, and in 1849 married Mr. Davenport. Afterwards she accompanied her husband in his starring engagements and played in the chief American cities. Her daughters, Fanny Lily Gipsy, Blanche Maria, Lily Antoinette, and Marion Caroline have all appeared on the stage.

DAVENPORT, FANNY LILY GIPSY, born in London, April 10, 1850; was educated in the Boston public schools, and at an early age made her first appearance at the Howard Athenæum in the play *Metamora*, in which she took the child's part. In 1862 she acted at Niblo's Garden, New York; subsequently at Little Tremont Theater in Boston, and in the Arch Street Theater in Philadelphia. In 1869 Augustin Daly secured her services for his Fifth Avenue theater in New York. She played here in *London Assurance*, *As You Like It*, *Oliver Twist*, *School for Scandal*, *Divorce*, *Leah*, and *Pique*. In the last mentioned her success was great. She has made starring tours through the United States. She brought out Miss Anna Dickinson's *An American Girl*, and Sardou's *Feodora*. Of late she has been giving *Cleopatra*. In 1879 she married Edwin H. Price, but secured a divorce and afterwards married Melbourne McDowell.

DAVENPORT, HENRY KALLOCK, born in Savannah, Ga., Dec. 10, 1820, died in Franzensbad, Bohemia, Aug. 18, 1872. He entered the navy (1838) as midshipman; served until 1844 on various vessels; was appointed to the Coast Survey, sailed afterwards on the *Columbia*, and for the four years following was connected with the mail-

steamship service. He was present in 1856 when the Barrier forts of the Canton River were taken, and later he was detailed to duty at the National Observatory in Washington, D. C. He was attached to the *Cumberland* during the civil war. From 1864 to 1866 he was with the Pacific squadron and commanded the *Lancaster* and *Powhatan*. In 1863 he was made captain, and in 1870 was placed in command of the frigate *Congress* of the European squadron.

DAVENPORT, JOHN, born in Coventry, England, in 1597, died in Boston, Mass., March 15, 1670. He was educated at Oxford and ordained to the Anglican priesthood. He preached in London, and became famous for his learning and faithfulness to his duties. He was suspected of Puritan principles and summoned before Archbishop Laud to answer the charges. About this time his friend John Cotton, having left the Established Church, Davenport was persuaded to do the same. He left England for Holland and spent two years in pastoral work, then returned to England. In 1637 he sailed for Massachusetts, and was welcomed cordially by the people of Boston. He afterwards became one of the founders of the New Haven Colony, one of the "seven pillars" of government, a protector of the regicides Goffe and Whalley, and died while he was pastor of the First Church in Boston.

DAVENPORT, THOMAS, inventor, born in Williamstown, Vt., July 9, 1802, died in Salisbury, Vt., July 6, 1851. In 1835 he had invented a rotary engine, whose motive power was electricity. He patented this invention and another, a small electric engine similar to a steam engine, and published a newspaper, "The Electro-Magnet," which was printed on a press run by one of these engines. He invented a method for applying electricity to the wires of a musical instrument, by means of which the tone is changed in fullness and power at the will of the player. His inventions were the result of costly experiments, which exhausted his resources.

DAVID, King of Israel. See *Britannica*, Vol. VI, pp. 886-42. See also Vol. XIII, p. 404; and Vol. XXI, p. 253.

DAVIDS, THOMAS WILLIAM RHYS, a British Orientalist, born at Colchester, May 12, 1843, and educated at the University of Breslau. He has held various appointments in Ceylon. His works include *Buddhism* (1878); a *Translation of the Fausbøll Collection of Buddhist Birth-Stories* (1880), and *Buddhist Suttas from the Pali* (1881).

DAVIDSON, SAMUEL, D.D., LL.D., English exegete, born near Ballymena, Ireland in 1807; educated at the Royal College of Belfast; entered the Presbyterian ministry, and was called in 1835 to the chair of Biblical criticism in his own college. Becoming a Congregationalist, he was called in 1842 to the chair of Biblical literature and Oriental languages in the Congregationalist College at Manchester, a position which he was compelled to resign on the publication of the volume which he contributed to a new edition of Horne's *Introduction*, though his theological opinions are moderately conservative. He was a member of the Old Testament revision committee. Among the best known of his works are *Biblical Criticism* (1852), *The Canon of the Bible* (1877), and his *Critical and Exegetical Introductions both to the Old and New Testaments*.

DAVIDSON, GEORGE, A. M., Ph. D., born in England in 1825; served in the United States Coast Survey on the Pacific and Atlantic during the civil war, and commanded the Alaska expedition to observe the total eclipse in 1869. In 1873 he determined the 120th meridian, and the year follow-



ing conducted the United States transit of Venus party to Japan. He is a member of many scientific societies, president of the California Academy of Sciences, and has published many valuable works on transit observations, transit instruments, irrigation, and river and harbor improvements.

DAVIDSON, LUCRETIA M., an American poetess, born in 1808, died in 1825. She began writing in childhood, and is said to have written 278 poems.

DAVIDSON, MARGARET MILLER, sister of Lucretia, born in Plattsburgh, N. Y., March 26, 1823, died in Saratoga, N. Y., Nov. 25, 1838. At the age of six she began writing poetry. When four years old she wrote in two days a drama, *Tragedy of Alethia*. Washington Irving introduced her poems to the public. The poems of the sisters have been published together.

DAVIDSON, ROBERT, educator, born in Elkton, Md., 1750, died Dec. 13, 1812. Graduating at the University of Pennsylvania, he taught there for some time; then in 1774 was licensed to preach, and was ordained the following year, becoming the assistant of Dr. Ewing in the first Presbyterian church of Philadelphia. He was chosen vice-president of Dickinson College in 1784, and from 1804 to 1809 he acted as its president. He was a fine scholar, and especially fond of the study of astronomy.

DAVIDSON, ROBERT, clergyman, born at Carlisle, Pa., Feb. 23, 1808, died in Philadelphia, April 6, 1876. He graduated at Dickinson College in 1828, and at Princeton Theological Seminary, and held pastorates at Lexington, Ky., New Brunswick, N. J., New York city, and Huntington, Long Island. For some time he was superintendent of public instruction in Lexington, Ky., and in 1840 became president of Transylvania University in that city. He was a commissioner of the American Board of Foreign Missions for twenty-five years; permanent clerk of the general assembly from 1845 to 1850; delegate to the general assembly of the Scottish Free church in 1869, and author of numerous writings, among which were *History of the Presbyterian Church in Kentucky*; *The Christ of God*; and *Elijah, a Sacred Drama*.

DAVIDSON, THOMAS, philosopher, born in the parish of Deer, Aberdeenshire, Scotland, Oct. 25, 1840; graduated at Aberdeen University, and afterwards was rector of the grammar school of Old Aberdeen, and then taught in various English schools. In 1866 he removed to London in Canada, and then to the United States, residing in Boston, Mass., for a time, and in St. Louis, Mo., where, besides doing literary work, he taught in the high schools. His contributions to various periodicals were usually on philosophical and philosophical subjects. He was connected with the "Round Table," and the "Western Educational Monthly." He removed from St. Louis to Cambridge, Mass., in 1875. Much of his life has been spent on the Continent, where he has made a study of Catholicism, archaeology, modern Greek, and the scholastic philosophy of Rosmini and Dante. He is an accomplished linguist, has been a lecturer before the Lowell Institute of Boston and elsewhere; was one of the founders of "The Fellowship of the New Life" (an organization having branches in London and New York), has undertaken a translation of Aristotle's complete works, and is author of *The Fragments of Parmenides*; *On the Origin of Language*; *The Place of Art in Education*; *Hand-book of Dante, from the Italian of Scartazzini*, and several other translations.

DAVIDSON, THOMAS, naval constructor, born in Nottingham, England, Aug. 28, 1828, died in Philadelphia, Pa., Feb. 18, 1874. He was the brother of the astronomer, George Davidson. His parents

moved to Philadelphia in 1832. A taste for mechanical invention was early shown, and the boy was apprenticed to a ship-builder. When but twenty-two years old he built his first ship. He was appointed quartermaster of the ship-carpenters in the Philadelphia navy yard. He became commander in 1866, holding this office up to his death. During the civil war he accomplished some remarkable feats. He built the *Tuscarora* in fifty-eight working days, the *Miami* in twenty-seven and the *Juanita* in seventy days. The last was his greatest achievement, as this was a ship of 1,240 tons and 7 guns. At one time during the war he was at work repairing forty-two ships and building several new ones. Under his directions the *Monongahela*, which by earthquake had been driven forty feet upon the beach at Santa Cruz, was safely moved lengthwise to the ocean and then over a coral reef 2,500 feet wide, when it once more floated in deep water.

DAVIDSON, WILLIAM, soldier, born in Lancaster county, Pa., killed at the battle of Cowan's Ford, N. C., Feb. 1, 1781. He served in the war of the Revolution at the battles of Brandywine, Germantown and Monmouth. He was severely wounded near Carlson's Mill, but within two months was back in service with the rank of brigadier-general. While on duty with 250 men to oppose the passage of the Catawba River by Cornwallis, his men were seized with a panic and fled before the fire of the British, and General Davidson was killed. Davidson College, N. C., was named in his honor.

DAVIDSON COLLEGE. See COLLEGES, in these Revisions, and Additions.

DAVIE, WILLIAM RICHARDSON, soldier, born in Egremont, near Whitehaven, England, June 20, 1756, died in Camden, S. C., Nov. 8, 1820. He came to America in his boyhood, and resided near the Catawba in South Carolina, graduated at Princeton; served as volunteer in New York; studied law in Salisbury, N. C.; again entered the army; joined Pulaski's legion, and at the battle of Stone Ferry (June 12, 1779) was severely wounded. He fought at Hanging Rock and Rocky Mount; at Wabab's Plantation, and at Charlotte, N. C.; he withstood three charges of Tarleton's legion. He was made commissary-general of the Southern army. After the war he served in the legislature; drew up the act establishing the University of North Carolina; acted frequently as boundary commissioner; was elected governor of the State in 1799, and was sent to France by President Adams on a special embassy. President Jefferson appointed him to draw up a treaty with the Tuscarora Indians in 1802.

DAVIES, CHARLES, mathematician, born in Washington, Litchfield county, Conn., Jan. 22, 1798, died at Fishkill Landing, N. Y., Sept. 17, 1876. He graduated from West Point; served in New England garrisons and at West Point, where he resigned his commission and became professor of mathematics in the school, and from 1839 to 1841 he held the same position in Trinity College, Hartford, Conn. From 1841 to 1845 he was United States Army Paymaster. In 1848 he accepted the chair of mathematics and philosophy in the University of New York. He held the position for a year, taught in the Albany Normal School and returned to New York, where he became professor of higher mathematics in Columbia College (1857-65). He devoted much time to the preparation of a series of books on mathematics. *Descriptive Geometry*; *Differential and Integral Calculus*; *Logic and Utility of Mathematics*; and *The Metric System* were some of his best works.

DAVIES, HENRY EUGENE, born at Black Lake, near Ogdensburg, N. Y., Feb. 8, 1805; died at New

York city, Dec. 17, 1881. He studied law with Judge Alfred Conkling, and was admitted to the bar at Utica in 1826. After living in Buffalo he removed to New York, and in 1850 was chosen corporation counsel, and justice of the State supreme court five years later. From 1860 to 1869 he was in the court of appeals, and afterwards became the partner of Judge Noah Davis.

DAVIES, HENRY EUGENE, son of Henry Eugene, born in New York city, July 2, 1886. He was educated at Harvard, Williams and Columbia, graduating at the last-named college, and became a lawyer. He served throughout the war, and rose to the rank of major-general of volunteers. From 1866 to 1869 he was public administrator of New York city, and from 1870 to 1872 assistant district attorney of the southern district of the State.

DAVIES, JOHN LLEWELLYN, English clergyman and author, born at Chichester, Feb. 26, 1826, and educated at Repton school and Trinity College, Cambridge, becoming a fellow of the college in 1850. Ordained in 1852, he was appointed incumbent of St. Mark's Church, London, and subsequently became rector of Christ Church. He was for some years principal of Queen's College, London, is chaplain in ordinary to the Queen, and has been a frequent contributor to periodical literature. He has published *Theology and Morality*, *Belief and Practice* (1873), and *The Christian Calling* (1875).

DAVIES, LOUIS HENRY, Canadian statesman, born in Charlottetown, Prince Edward Island, May 4, 1845. He received his education at Central Academy and Prince of Wales College in his native town, and then fitted himself for the legal profession. He was twice chosen solicitor-general of his province, was opposition leader in the legislative assembly, and premier and attorney-general. These offices he held from 1876 to 1879. He was in the local legislature for most of the time from 1872 to 1879. From 1882 to 1886 he represented Queen's county of his island in the Dominion parliament. In the international fishery commission, which held its sessions at Halifax, Nova Scotia, in 1877, he was one of Great Britain's representatives. In politics Mr. Davies is a Liberal.

DAVIES, SAMUEL, clergyman, born near Summit Ridge, Newcastle county, Del., Nov. 3, 1724, died in Princeton, N. J., Feb. 4, 1761. He was ordained to evangelical work in Hanover county, Va., and some years later he went to England to assist in obtaining funds for the College of New Jersey. He was well received and obtained the funds. He became president of Princeton in 1759, succeeding Jonathan Edwards. Mr. Davies was eminent as a pulpit orator.

DAVIES, THOMAS ALFRED, soldier, born in St. Lawrence county, N. Y., December, 1809. In 1829 he graduated from the United States Military Academy, and served on frontier duty. In 1831 he resigned his commission and served as one of the Croton Aqueduct engineers. When the civil war broke out he entered the army as colonel of the 16th New York, and was present at Bull Run, the defenses of Alexandria, siege of Corinth, and the battle of Corinth (Oct. 3-4, 1862). From 1862 to 1865 he commanded various districts, and in the last-named year was brevetted major-general of volunteers. He has published several works on theological subjects.

DAVIESS, JOSEPH HAMILTON, lawyer, born in Bedford, county, Va., March 4, 1774, killed in the battle of Tippecanoe, Nov. 7, 1811. He studied for the legal profession, and attained considerable fame as lawyer and patriot. He became United States attorney for Kentucky, and his most notable

act in that capacity was the bringing of charges against Aaron Burr for "levying war against a nation with which the United States was at peace." Witnesses against Burr failed to appear, and thus the charges were not sustained. In 1811 he fought the Indians under Gen. William H. Harrison, and was killed in battle. Several counties have been named for him.

DAVIS, ANDREW JACKSON, spiritualist, born in Orange county, N. Y., Aug. 11, 1826. In his youth he lived in great poverty, and obtained very little education; but he developed great clairvoyant powers, and is reported to have frequently fallen into trances in which he asserted he conversed with spiritual beings, and received instruction concerning the future state. While in a trance he dictated to Rev. William Fishbough his first book on *The Principles of Nature*. He has lectured and written many books in the interests of spiritualism. The ideas advanced by him are startling, and are concerning things incapable of verification.

DAVIS, CHARLES HENRY, naval officer, born in Boston, Mass., Jan. 16, 1807, died in Washington, D. C., Feb. 18, 1877. In 1823 he entered the navy, served in the Pacific, and was ordered to the Mediterranean squadron. He subsequently was engaged in coast duty (1842-56). While surveying in the vicinity of Nantucket he discovered several small shoals in the track of ocean steamers sailing between Europe and New York, and some hitherto unexplained accidents seemed to be accounted for. In 1861 he became a member of a board to inquire into the condition of Southern coasts, harbors, and defenses. The investigations resulted in a decision to send an expedition against Port Royal. He was made flag-officer of the Mississippi squadron, and joining Admiral Farragut, engaged in the Vicksburg operations and an expedition up to Yazoo River. In 1863 he was made rear-admiral, and from 1867 to 1869 was commander of the South Atlantic squadron. When he returned he was appointed commander of the United States navy-yard at Norfolk. Commodore Davis was a member of several scientific societies; he was also a writer on mathematical, astronomical and geodesic subjects.

DAVIS, DAVID, jurist, born in Cecil county, Md., March 9, 1815, died in Bloomington, Ill., June 26, 1886. He graduated from Kenyon College, O., studied law in Massachusetts and at New Haven, and settled in Bloomington, Ill. He sat in the legislature in 1844, and was three times elected judge of the eighth judicial circuit of the State, but resigned his position in 1862. President Lincoln, whose intimate friend he was, appointed him as a justice of the United States Supreme Court, and he was executor of Lincoln's estate. In 1872 he was nominated as candidate for the Presidency by the Labor Reform party. He left the supreme bench in 1877 to take his place in the United States Senate, having been elected to succeed John A. Logan. At the death of President Garfield he was chosen President of the Senate; in 1883 he resigned his seat. Judge Davis was an Independent, but usually voted in Congress with the Democrats.

DAVIS, EDWIN HAMILTON, physician and archaeologist, born in Ross county, O., Jan. 22, 1811, died in New York city, May 15, 1888. He was educated for the medical profession, and became professor of materia medica and therapeutics in New York College. He is best known by his interest in American antiquities, his exploration of Indian mounds and his collections of mound relics. He wrote *Ancient Monuments of the Mississippi Valley*, which was the first volume published by the Smithsonian Institution.



DAVIS, GARRET (1801-72), American lawyer and statesman, born at Mount Sterling, Ky., Sept. 10, 1801, received a classical education, and was admitted to the bar in 1823. He was elected to the State legislature in 1833, was in 1839 member of the State constitutional convention, and in the same year was elected to Congress, serving till 1847. At the commencement of the civil war he exerted himself to prevent the secession of his native State, and was elected to the United States Senate to succeed John C. Breckinridge. He served in the Senate till his death, which occurred Sept. 22, 1872.

DAVIS, HENRY WINTER, statesman, born in Annapolis, Md., Aug. 16, 1817, died in Baltimore, Dec. 30, 1865. His father, a Protestant Episcopal clergyman, was president of St. John's College. Surrounded by and associating with slaves, the son's opinions were colored by what he early learned of the institution of slavery. He studied law, was admitted to the bar, gained a reputation as an orator, in 1854 was elected to Congress and served for three consecutive terms. On the dissolution of the Whig party he became a radical Republican. In 1860, when Mr. Lincoln was nominated for President, the Vice-Presidency was offered to Mr. Davis, but he declined the honor, and later refused to accept any cabinet position. From 1863 to 1865 he was again in Congress and served as chairman of the committee on foreign affairs. He favored the enlistment of negroes, and the extension of the right of suffrage to them. A day was set apart by Congress, at his death, for the commemoration of his public services—an honor never before paid to an ex-congressman.

DAVIS, JEFFERSON, born in Christian (now Todd) county, Ky., June 3, 1808, died Dec. 6, 1889. He studied at Transylvania College, and in 1828 graduated at West Point, having been appointed to the Military Academy by President Monroe. His first military service was during the Black Hawk war, after which he resigned his commission and became a cotton planter near Vicksburg, Miss. In 1843 he entered politics, gained a reputation as a popular speaker, and two years later was sent to Congress, resigning his seat in 1846 to enter the Mexican war. With his regiment, the 1st Mississippi volunteers, he joined Gen. Taylor on the Rio Grande and fought at Monterey and Buena Vista, where Col. Davis was wounded. He declined a brigadier-generalship offered by President Polk, on the ground that a "military appointment by a federal executive was unconstitutional." From 1847 to 1851 he was in the United States Senate, where he held the office of chairman of military affairs, and in debate was known as the champion of slavery and State rights. Resigning his seat in 1851 he canvassed the State for the office of governor, but was not elected, although he received a large vote.

In 1852 he assisted in the election of Franklin Pierce, and when the latter became President Mr. Davis was made Secretary of War, and he introduced various improvements—such as the use of the Minié ball, iron gun-carriages, etc. In 1857 he reentered the Senate, becoming the Democratic leader of the 36th Congress. Here he opposed the French spoliation bill, and the "popular sovereignty" doctrine, but favored the passage of the Kansas conference bill. In 1860 he received several votes for Presidential nomination at the Democratic national convention, but his friends said he did not care for the honor. In a speech in 1860, shortly before leaving Congress, he discriminated between Independence, which had been dearly bought, and the Union, which had cost "little time, little money, and no blood." Appointed on

the Senate committee to examine into the condition of the country, he reluctantly consented to serve, and made an address, in which he affirmed his willingness to do anything to avert the impending struggle.

When Mississippi seceded from the Union Mr. Davis resigned his seat, and the following month was appointed commander-in-chief of the Southern army. On Feb. 18, 1861, he was elected president of the Confederate States. He formed his cabinet, and in his first message to the provisional Confederate congress commended the attack on Fort Sumter and characterized President Lincoln's action in calling for volunteers as unconstitutional and absurd, saying: "All we ask is to be let alone." In April, 1861, Mr. Davis issued a proclamation inviting applications for letters of marque and reprisal. Two vessels thus commissioned were captured, their crews tried for piracy and sentenced to death, but an exchange of prisoners was finally agreed upon.

On Feb. 22, 1862, Mr. Davis was reelected president for a term of six years. When President Lincoln issued the emancipation proclamation, which went into effect Jan. 1, 1863, Mr. Davis, in a retaliatory message, declared Gen. Butler, then in command of New Orleans, a felon and deserving of death, should he fall into Confederate hands; his officers were also denounced. In the message to the Southern congress that year Mr. Davis took a sanguine view of the condition of affairs, but there were defeats at Vicksburg and Gettysburg; coin was scarce, taxation was excessive, the conscription law gave offense, and the army food-supply was inadequate. Trouble arose in the cabinet, the secretary of the treasury resigned, and financial ruin threatened the country.

The year 1864 opened favorably for the Southern army, but by the middle of July the tide had turned. When Atlanta fell, Mr. Davis visited Georgia and tried to raise the spirits of the people, but he was not very successful. The Southern peace party was gaining in numbers, and Mr. Davis sent three commissioners to treat for peace with the United States. The meeting took place on a steamer in Hampton Roads, but no good resulted. On the return and report of the commissioners meetings were held and attempts made to revive popular enthusiasm; but Sherman had gained the sea, Grant was drawing his lines closer about Richmond, and Mr. Lincoln was reelected President. The Confederate congress began to grow uneasy and to show lack of confidence in the administration, and the secretary of war resigned his portfolio.

Mr. Davis's last message was dated March 13, 1865, and in it he confesses the gravity of the situation, yet asserts that there are ample means for bringing things to a successful termination. Twenty days later he left Richmond, and on April 9, 1865, Lee surrendered to Grant. Mr. Davis went to Danville, then to Greensborough, N. C., where he conferred with Gens. Johnston and Beauregard; to Charlotte, and at Irwingsville, Georgia, on May 10, he was captured by a company of Union soldiers under Lieut.-Col. Pritchard. He was taken to Fortress Monroe and confined for two years, while the authorities at Washington were deciding what should be done with him. He was indicted for treason in 1866, but it was difficult to come to an agreement as to the time and place of his trial. On May 13, 1867, Mr. Davis was brought into court at Richmond and admitted to bail. He was never brought to trial, but was included in the general amnesty declared in December, 1868.

After regaining his freedom Mr. Davis was enthusiastically received in the South. In a speech

made in the summer of 1871, he declared himself still in favor of State rights, and affirmed that he did not "accept the situation." When the bill to remove all political disabilities from those who had taken part in the Southern cause came before the House of Representatives in 1876, James G. Blaine, in an amendment speech, proposed that Mr. Jefferson Davis should alone be excepted, saying that he was "the author of the gigantic murders and crimes at Andersonville." To this charge Senator Benjamin H. Hill, of Georgia, replied with a defense of Jefferson Davis. In 1881 Mr. Davis published in two volumes *The Rise and Fall of the Confederate Government*.

DAVIS, JEFFERSON C., soldier, born in Clark county, Ill., March 2, 1828, died in Chicago, Ill., Nov. 30, 1879. He served in the Mexican war, was one of the defenders of Fort Sumter, served in Missouri, was at the battle of Pea Ridge, siege of Corinth, fight at Stone River; commanded the 14th corps in Sherman's army in Georgia; was brevetted major-general, and after the war was put in charge of the United States troops in Alaska. In 1873 he was at the head of the troops sent to subdue the Modoc Indians. In a quarrel with General William Nelson, at Louisville, Ky., Gen. Davis shot and killed him, Sept. 29, 1862. He was arrested, but after a time was liberated, and the case was never brought to trial.

DAVIS, JOHN, a farmer and journalist, born in Sangamon county, Ill., Aug. 9, 1826. He was educated at the Springfield, Ill., Academy and the Illinois College at Jacksonville, Ill. He removed to Kansas in 1872, and engaged in farming and conducted a newspaper at Junction City. In politics he adhered to the principles of the Farmers' Alliance, and was an active member of various farmers' political organizations, and of the Knights of Labor; was president of the first State farmers' convention held in Kansas. In 1890 he was elected a Representative from the 5th Congressional District of Kansas to the 52d Congress.

DAVIS, JOHN, statesman, born in Northborough Mass., Jan. 13, 1787, died in Worcester, Mass., April 19, 1864. He graduated at Yale, studied law and began to practice in Worcester. In 1824 he was elected to Congress, where he opposed Henry Clay's tariff bill. He was elected governor of Massachusetts in 1834, and afterwards was sent to the United States Senate; when he was again, in 1841, elected governor. From one of his protection speeches originated the epithet "Ten-Cent Jimmie," which afterwards clung to James Buchanan; Mr. Davis claiming that Mr. Buchanan would like to have the wages of American workmen reduced to ten cents a day. From 1845 to 1853 he served in the United States Senate and then declined a reelection. Mr. Davis, when in Congress opposed the Mexican war; advocated the exclusion of slavery from the Territories, and for his uprightness was frequently called "Honest John Davis."

DAVIS, JOHN CHANDLER BANCROFT, American jurist and diplomatist, born at Worcester, Mass., Dec. 29, 1822, graduated at Harvard College in 1840, and became a lawyer. In 1849 he went to London as secretary of legation, where he remained until 1852. On his return he settled to the practice of law in New York, and in 1869 was elected to the State legislature. Appointed Assistant Secretary of State at the commencement of President Grant's administration, he became American secretary in the joint commission which concluded the Treaty of Washington in the spring of 1871; prepared the American case for submission to the tribunal of arbitration for the settlement of the Alabama claims; went to Geneva as the agent of the United

States at the meeting of the tribunal, and on his return in 1873 resumed the position of Assistant Secretary of State. He served as United States minister to Germany from 1874 to 1877, and on his return was appointed a judge of the court of claims. He has published several law-books, was American correspondent of the London "Times" from 1864 to 1861, and has contributed to "Fraser's Magazine" and the "Edinburgh Review."

DAVIS, SIR JOHN FRANCIS, K. C. B., born in London in 1795, died Nov. 13, 1890. He was long a resident in China as chief superintendent of Canton, and afterwards as governor and commander-in-chief of the colony of Hong-Kong; was one of the best and most trustworthy authorities on China and the Chinese. He was created a baronet in 1845. His *China During the War and Since the Peace*, appeared in 1852, and was followed in 1857 by his *China: a General Description of that Empire*.

DAVIS, NATHAN SMITH, author and physician, born in Greene, Chenango county, N. Y., Jan. 9, 1817. He received his medical education in Fairfield, N. Y., resided in Binghamton, and in New York city, and then went to Chicago to accept the professorship of physiology and pathology in Rush medical school. He was one of the founders of the Northwestern University; the Washingtonian Home for Inebriates, and the Chicago Academy of Sciences. While in New York he was editor of the "Annalist," and in Chicago he conducted successively the "Medical Examiner," "Northwestern Journal" and "Journal of the American Medical Association." In 1886 he became professor of the principles and practice of medicine in Chicago medical college, and is also dean of the faculty. He has held many offices connected with scientific or educational institutions, and among his numerous writings are the following: *Essay on the Philosophy of Medicine; Remedial Value and Proper Use of Alcoholic Drinks; History of Medical Education; and Clinical Lectures*.

DAVIS, NOAH, jurist, born in Haverhill, N. H., Sept. 10, 1818. He graduated from the Lima seminary, and practiced law in Gaines and in Buffalo, and in 1844 he entered into partnership with Sanford E. Church, at Albion. From 1857 to 1868 he was a justice of the New York supreme court, and in the latter year he was sent by the Republican party to Congress. In 1870 he accepted President Grant's appointment as United States attorney for the southern district of New York, and in 1872 became justice of the supreme court in the same district. The William M. Tweed trial, and the trial of Edward Stokes for the murder of Fisk, were celebrated cases which came before him. In 1887 he was retired from office and resumed his practice.

DAVIS, REBECCA HARDING, born in Washington, Pa., June 24, 1831; is a clever magazine writer, the wife of L. Clark Davis, a journalist. Her early days were spent in West Virginia, and her first notable story was called *Life in the Iron Mills* and appeared in the "Atlantic Monthly" in 1861. After her marriage she removed to Philadelphia, Pa., and in 1869 she was given a place on the editorial staff of the "New York Tribune."

DAVIT, in ship-building, a piece of timber projecting over the bow or front part of a vessel, and used as a crane for hoisting the anchor clear of her bow; two such pieces of timber or iron on her side or stern are used for hoisting or lowering the boats.

DAVITT, MICHAEL, founder of the Irish Land League, born near Straide, Ireland, in 1846. The family were evicted in 1851, and went to England. He lost his right arm in 1857 in a Lancashire cotton mill. In 1866 he became connected with the Fenian movement, and in 1870 he was sentenced



to fifteen years' penal servitude. Being released in 1877, he visited the United States, and afterwards began a crusade in Ireland, which resulted in the foundation of the Land League in 1879. In 1881, after a second visit to America, he was imprisoned for breaking his ticket-of-leave. In 1885 he published his *Leaves from a Prison Diary*. His popularity was attested by the national present of Land League Cottage, near Dublin, on his marriage in 1887. In 1889 he made a powerful and effective speech in his own defense before the Parnell Commission. In 1890 he began the publication of the "Labour World," acting as its editor; and since the division of the Irish Parliamentary party he has been in opposition to Mr. Parnell.

DAVOUST, LOUIS NICHOLAS, marshal of France, born in Burgundy in 1770, died in 1823. He was educated with Napoleon at Brienne, and distinguished himself in nearly all the wars of the period in the service of Napoleon, who conferred honors on him, making him marshal of the Empire, duke of Auerstädt, and prince of Eckmühl. He was governor of Poland, and governor-general of the Hanse towns, and held many other positions of honor, displaying firmness and courage, but he was rapacious and cruel.

DAWES, HENRY LAURENS, statesman, born in Cummington, Mass., Oct. 30, 1816. He graduated from Yale, taught school, and edited successively the "Greenfield Gazette," and "Adams Transcript." He became a member of the legal profession and was sent to the legislature. Since 1857 he has been a member of Congress, where he has been a diligent worker for the Indian cause; the author of several tariff bills; and has served on important committees. He inaugurated the measure for the completion of the Washington Monument; was delegated to investigate disturbances in the Indian Territory; was author of the severalty bill, the Sioux bill, and the bill which makes the Indians subject to and protected by United States criminal laws. At the suggestion of Prof. Cleveland Abbé, Senator Dawes introduced the "Weather Bulletin" measure in 1869; weather reports from all parts of the country are collected, and by comparisons the probabilities concerning coming storms can be approximately predicted.

DAWKINS, WILLIAM BOYD, F. R. S., English geologist, born near Welshpool, Montgomeryshire, Dec. 26, 1838, and educated at Rossall School and Jesus College, Oxford. He joined the Geological Survey in 1862, became curator of Manchester Museum in 1869, and professor of geology in Owens College, Manchester, in 1874. He presided over the anthropological section at the Southampton meeting of the British Association in 1882, and in the same year was employed by the Channel Tunnel committee to make a special survey of both coasts. Professor Dawkins, as a member of the Royal and other learned societies, has contributed numerous papers to issues relating especially to fossil mammalia. His books are *Cave-hunting Researches on the Evidences of Caves Respecting the Early Inhabitants of Europe* (1874), and *Early Man in Britain and His Place in the Tertiary Period* (1880), the latter a work of great interest.

DAWSON, a town of Georgia, county-seat of Terrell county, about twenty-five miles northwest of Albany. It contains a manufactory of railroad cars, and is the seat of the South Georgia Male Institute.

DAWSON, SIR JOHN WILLIAM, a Canadian geologist, born in Pictou, Nova Scotia, Oct. 13, 1820. He was educated at Pictou College and Edinburgh University, and in 1842 was with Sir Charles Lyell in his scientific expedition in Nova Scotia, when he

made discoveries in paleontology. He was appointed superintendent of education in Nova Scotia in 1850, and principal of M'Gill College, in 1855. He established the M'Gill normal school, and a school for civil engineering, which he afterwards incorporated as a department of the college. Dr. Dawson is a member and an officer in many scientific societies, and he was knighted in 1885. He has discovered and described a number of fossils of which the most important is named *Eozoon canadense* (see Britannica, Vol. IX, p. 384). He opposes the extreme Darwinian theory, and contends that the discoveries of science are in harmony with Revelation. Dr. Dawson has written numerous scientific papers.

DAY, HORACE HOLLISTER, born in Massachusetts, 1813, died in 1878. A man of large views, generous impulses, and most active business habits; he acquired a large fortune, most of which he lost in speculation in the manufacture of India rubber, and in various important projects, that somehow were taken out of his hands. He was an inventor of great skill, and an unflinching champion of the working classes. At the time of his death, which occurred suddenly, he was engaged in large business operations near Montreal, Canada, which promised to be very successful. He was a powerful speaker and writer, devoting much of his time to the labor question.

DAY, JEREMIAH, educator, son of Rev. Jeremiah Day, born in New Preston, Conn., Aug. 3, 1773, died in New Haven, Aug. 22, 1867. He graduated with honors at Yale in 1795, then became tutor at Williams, and subsequently at Yale, where in 1803 he became professor of mathematics and natural philosophy, and in 1817 was elected president of the college. He was ordained to the ministry on the day of his inauguration. He held office until 1846, when he resigned. He was author of a work on algebra and plane trigonometry, and wrote *Mensuration of Superficies and Solids; Navigation and Surveying; and An Inquiry on the Self-Determining Power of the Will, or Contingent Volition*.

DAY, SIR JOHN CHARLES, an eminent English barrister and jurist, born in 1826. He joined the Middle Temple in 1845, was called to the bar in 1849, and became queen's counsel in 1872. In 1882 he was knighted by the queen, and appointed a judge of the queen's bench division of the high court of justice. He is more particularly known in the United States as having been chairman of the Belfast riots commission and a member of the Parnell Commission. He is editor of the *Common Law Procedure Acts*, and of Roscoe's *Nisi Prius*.

DAY, THOMAS, a political writer and poet, born in London, June 22, 1748, died in 1789. He studied law, but turned his attention to literature, and the American War of Independence, a cause with which he strongly sympathized, roused his energies. He is, however, most widely known as the author of *Sandford and Merton*, and of the *History of Little Jack*. His death in 1789 was caused by a fall from a horse.

DAYE, STEPHEN, the first printer in the English-American colonies, born in London, 1611, died in Cambridge, Mass., Dec. 22, 1668. When Harvard College was established, a wealthy Non-conformist minister shipped a printing-press to America; with it came Mr. Glover, the donor, and Mr. Daye. The former died on the voyage and Mr. Daye set up the press and printed "The Freeman's Oath." Later he printed a metrical version of the Psalms (1640), a *Catechism*, and *Body of Liberties*, containing the one hundred laws of the colony. Massachusetts granted him 300 acres of land for "being the first that sett upon printing."

**DAY-LILY** (*Heimerocallis*), a genus of plants of the order *Liliaceae*, having a perianth with bell-shaped limb, and sub-cylindrical tube, and globose seeds with *testa*.

**DAYS OF GRACE.** The time at which a bill is actually *due*, or at *maturity*, is in general three days after the time expressed on the face of it. The additional days, which are generally allowed by the custom of merchants, are called days of grace. If the third day of grace should fall on Sunday, the bill is payable the day before.

**DAYSMAN**, a name formerly given in England (and still in use in some of the northern countries), to an arbitrator, umpire, or elected judge. It has its origin in the judicial language of the Middle Ages, when the word *day* was specially applied to the day appointed for hearing a cause, or for the meeting of an assembly. A daysman was thus a judge appointed to decide between parties at a judicial hearing. The word occurs in Scripture, where Job sorrowfully says, in reference to his relation to God: "Neither is there any daysman betwixt us, that might lay his hand upon us both" (Job ix, 33).

**DAYTON**, a mining town of Nevada, county-seat of Lyon county, situated on the Carson River, about twelve miles east of Virginia City. It is engaged in the mining of silver, and contains a number of quartz mills.

**DAYTON**, a city of Ohio, and county-seat of Montgomery (see *Britannica*, Vol. VI, p. 848). Dayton is an important railroad center, being the terminus of no less than eight railroads. The city is regularly laid out, with broad streets, 100 feet wide, crossing each other at right angles. Its manufactures include cotton and woolen goods, oil, flour, machinery, railroad cars, paper, stoves, hollow-ware, agricultural implements, furniture, carriages, etc. Dayton supports an admirable system of public schools, and has also a high school, two Catholic schools, and several high-grade preparatory schools for boys. It is also the seat of the Westfall Female Academy. Its public buildings are beautiful and imposing, the more noteworthy being the county court-house, jail, public markets, and the group of buildings which comprise the National Soldiers' Home. The court-house is an elegant structure, 127 feet in length and 62 in width, built of white marble, quarried in the vicinity. It cost \$170,000. The jail is a stone edifice, and cost \$400,000. An abundant water power, which contributes greatly to the prosperity of its manufacturing interests, is provided by a hydraulic canal, which brings the water of the Mad River through the city. Population of the city in 1880, 38,678; in 1890, 58,868.

**DAYTON**, a town of Washington, county-seat of Columbia county, about thirty miles northeast of Walla Walla, contains a variety of manufactures, and is the trade-center of a rich agricultural district.

**DAYTON**, AMOS COOPER, born in Plainfield, N. J., Sept. 4, 1813, died in Perry, Ga., June 11, 1865. He graduated from the medical college of New York, but his health being poor he went South, joined himself to a church of Presbyterians, but, becoming dissatisfied, united with a Baptist church and afterwards was the author of controversial writings; his religious novel, *Theodosia*, is an example. He was associated editor of the "Tennessee Baptist," and he wrote another novel, *The Infidel's Daughter*.

**DAYTON**, WILLIAM LEWIS, an American statesman, born at Baskingridge, N. J., Feb. 14, 1807, died in Paris, Dec. 1, 1864. He graduated at Princeton College in 1825, and was admitted to the bar in 1830. He was elected to the State Senate in 1837, and in 1838 was made a justice of the State su-

preme court. He served in the United States Senate from 1842 to 1851, and as attorney-general of New Jersey from 1857 to 1861. In 1861 he was appointed by President Lincoln minister to France.

**DAZA**, HILARION, Bolivian statesman, born in Sucre, in 1840. He is partly of Indian blood, and his parents were of humble origin. At the age of eighteen he entered the army of liberals, and through a series of revolutions became popular and won the regard of Melgarejo. In 1871 he turned against his friend, and for his service in quieting the turbulent factions, President Morales, who had supplanted Melgarejo, promoted Daza and made him secretary of war. Morales died in 1872, and in a subsequent election Daza claimed to be elected, seized the government and was inaugurated May 4, 1876. His administration was popular, and as quiet as any previous one. In 1879 the war with Chili broke out. Daza left the government in the hands of his foreign minister while he marched with 4,000 Bolivian soldiers into Peru, and southward to Chili. His march was slow and timid, and when he had entered Chili, he left his army to its fate and hurried back to the capital. Before reaching here he heard there had been a revolution in La Paz, and Gen. Narciso Campero had been chosen as his successor. Daza had lost favor with the people, and his soldiers had threatened to shoot him as a coward. He made no attempt to regain his authority, and went abroad.

**D'AZARA**, DON FELIX, an eminent naturalist, born in Aragon in 1746, died in 1811. He published an important work, entitled *Notes on the Natural History of Paraguay and La Plata*.

**DEACONESS**, an order of women in the early church whose duties closely resembled those of the deacons (see *Britannica*, Vol. VII, p. 1). In 1836 it was revived, with modifications, by pastor Fliedner, at Kaiserwerth, Germany, and since that time the order, with the name, has gradually made its way into England and the United States, in the Protestant Episcopal and Methodist Episcopal Churches. A full account of the modern deaconess movement, which is modeled on that of Pastor Fliedner, will be found in *Britannica*, Vol. IX, p. 307; Vol. XIII, p. 825.

**DEAD**, in seafaring language, a term very frequently employed as a part of a designation or phrase, having in general a meaning somewhat opposite to that of *active*, *effective*, or *real*. The chief of such phrases are the following: *dead eyes* are circular, flattish wooden blocks, which, with other apparatus, form a purchase or tackle for extending the standing rigging and other purposes. *Dead flat* is the name for one of the midship-timbers. *Dead lights* are strong wooden shutters to close cabin windows. *Dead rising* is a name for that part of a ship's bottom where the floor-timbers terminate, and the lower futtocks or foot-hooks begin. *Dead ropes* are such as do not run in blocks. *Dead wood* consists of blocks of timber laid upon the keel, especially fore and aft; it is piled up, and fastened to the keel with iron spike-nails; the chief object is to give solidity and strength to the ends of the ship.

**DEAD-FREIGHT**, the compensation paid by the merchant who freights a whole ship to the shipmaster for the space which is not occupied. It is rather a claim for damages for the loss of freight, and consequently, apart from positive stipulation. The shipmaster has no lien for dead freight over the goods on board. His claim must, consequently, be made effectual by a personal action against the freighter.

**DEAD**, JUDGMENT OF THE (in ancient Egypt). The papyrus rolls found with Egyptian mum-



mies contain a description of the fate of the departed subsequent to their death. Usually, even the most unfinished specimens bear the most important scene, representing Ma-t, the Goddess of Truth and Justice, leading the dead into the judgment hall of the nether world, before Osiris, the judge of the dead (see Britannica, Vol. VII, p. 718). The throne of the god faces the entrance. A large balance stands in the center of the hall, containing in one scale an ostrich feather, the symbol of truth, and in the other a vessel formed like a human heart. The accuser is a female hippopotamus. The deceased must clear himself from forty-two sins, each of which is presided over by one of the forty-two gods sitting above (see Britannica, Vol. II, p. 146). The balance is attended to by the gods Horus and Anubis, and the result, which is naturally assumed to be favorable, is written down by the justifier, the ibis-headed Thoth-Hermes.

DEAD-LETTER OFFICE, a postal department for the reception of unclaimed letters, after the office to which they were originally directed has held them for a specified time. In the United States all letters, not called for within a month, are sent to this department, after which they are destroyed unless the writer's name and address can be determined. In that event they are returned to him. During the fiscal year ending June 30, 1890, there were received at the dead-letter office 6,694,962 pieces of dead mail matter. Of this number nearly 5,500,000 contained nothing of value. About 3,350,000 contained no signature which would enable the department to return them to the writers; 319,000 of the letters opened contained valuable inclosures, including about \$1,400,000 in negotiable paper and \$40,000 in money; 11,000 letters containing lottery tickets, and 200,000 containing pictures and papers unfit for circulation, were destroyed. About 200,000 pieces were returned unopened to the owners; and 1,500,000 were restored after they had been opened, the information necessary to restoration having been ascertained from the contents. Of 39,000 parcels of merchandise unclaimed for two years, and sold at auction, the proceeds were \$2,766. There were distributed among the inmates of hospitals, asylums, and other charitable institutions, 17,673 magazines, illustrated papers, picture cards, and valentines which could not be traced to their owners.

DEAD NETTLE (*Lamium*), a genus of plants of the natural order *Labiata*, having a five-toothed calyx and a two-lipped corolla, the upper lip arched and the lower lip trifid. The name is given for its resemblance to the true or stinging nettle.

DEAD'S PART, in Scotland, the portion of the movable estate of the deceased which remains over, after satisfying the legal claims of his wife and children, should he have left such. It is so called because it is with reference to this portion of his possessions alone that he possessed the power of disposal by will or testament.

DEAF-MUTES, EDUCATION OF THE. See DEAF AND DUMB, Britannica, Vol. VII, pp. 3-12.

DEADWOOD, a city of South Dakota, county-seat of Lawrence county, situated at the junction of Whitewood and Deadwood Gulches, about 250 miles north of Cheyenne, Wyo. It contains a variety of manufactories, and is the mining and trade-center of the Black Hills.

DEAL, a quaint old village and summer watering place in Monmouth county, N. J., five miles from Long Branch. It has a hotel, an academy and several boarding houses.

DEALFISH (*Trachipterus*), a genus of the ribbon-fish family. See Britannica, Vol. XX, p. 531.

DEALS, the trade-name in England for fire-boards exceeding six feet in length and seven inches in width. They are also occasionally called "planks," though this term is now somewhat loosely applied. Pieces of smaller dimensions are called "battens." Deals are usually 8 inches thick, and when sawed into thinner pieces, these are called "boards." When deals are sawed into twelve or more thin planks, they are called "leaves."

DEAN, Amos, lawyer, born in Barnard, Vt., Feb. 16, 1803, died Jan. 26, 1868. A graduate of Union and a law student, he was admitted to the bar and acquired a high reputation in the legal profession. He was one of the leaders in founding the Young Men's Association at Albany; was a professor in the law school, and professor of medical jurisprudence in the Albany medical school. He delivered lectures and wrote books on legal and medical subjects.

DEAN FOREST, a picturesque hilly tract of 22,500 acres between the Severn and the Wye, in the western part of Gloucestershire, England. It is mainly crown property, and about half of it, separated within an inclosure, is used for the growth of timber for the navy. It contains oak, beech, and other trees, and orchards from which is procured the famous Styre apple-cider; also coal and iron mines, and stone-quarries for building, grinding, and making troughs and rollers. It is divided into six walks. The inhabitants are mostly miners. Many ancient privileges were enjoyed by the early inhabitants, acquired by birth and by working a year and a day in this forest. These privileges were exemption from rates and taxes, free pasturage, right of mining—a sixth of the produce being due to the sovereign—and access to the woods for timber for their works. See COAL-FIELDS, Britannica, Vol. VI; and FORESTS, Vol. IX.

DEAN OF FACULTY, the president of the incorporation of advocates in Scotland, who, like the other officers of the faculty, is elected annually. He is usually reelected till promoted to the bench, when he has no further share in the deliberations, but is, however, still a member of the body.

DEAN, WILLIAM, a Baptist missionary, born in Eaton, N. Y., June 21, 1807. He graduated at Hamilton Literary and Theological Institution (now Colgate University), and the same year, 1833, left Boston on a ship bound for Siam. He settled as a missionary in Hong-Kong, remaining there till 1867 with but one year's exception, 1845, when he visited the United States. From 1867 to 1884 he resided in Bangkok, and then returned to America. He made several translations into Chinese, among them: *The New Testament*; *Revision of the Pentateuch*; *Commentary on Matthew*; *Commentary on Genesis*; *Commentary on Mark*; and *Commentary on Exodus*.

DEANE, CHARLES, born in Biddeford, Me., Nov. 10, 1813, educated at Thornton academy, Saco, Me., and became a merchant in Boston. Since 1864 he has resided in Cambridge, having retired from business. Besides being the author of a number of valuable historical papers he has made a collection of rare books relative to early New England history. He is a member of various historical societies, and in 1856 the degree of LL.D. was conferred on him by Bowdoin College.

DEANE, JAMES, geologist, born in Colerain, Mass., Feb. 14, 1801, died in Greenfield, Mass., June 8, 1858. He studied law and medicine, but practiced the latter. Much of his life was given to geological research, and he was the discoverer of fossil foot-prints in the new red sandstone of the Connecticut Valley. An illustrated work containing the results of his geological labors has been issued

since his death by the Smithsonian Institution. Mr. Deane was a contributor to scientific and medical journals.

DEANE, JAMES, Indian missionary, born in Groton, Conn., Aug. 20, 1748, died in Westmoreland, Oneida county, N. Y., Sept. 10, 1823. He graduated at Dartmouth in 1773, was missionary to the Canadian Indians from 1773 to 1774, and during the Revolutionary War was commissioned major and served as an Indian agent and interpreter at Fort Stanwix. At the close of the war the Indians gave him a tract of land near Rome, Oneida county, which he exchanged for a tract in Westmoreland, to which he removed in 1786. He was for some time judge in Oneida county.

DEANE, JOHN (c. 1679-1761), a seaman of England in command of a vessel wrecked off the coast of Maine in 1710. After twenty-one days of suffering from hunger and exposure the party were finally rescued. Deane became a naval officer under Peter the Great, and was for a long time British consul at Ostend.

DEANE, SILAS, diplomatist, born in Groton, Conn., Dec. 24, 1734, died in Deal, England, August 23, 1789. He graduated at Yale; was a delegate from his State to the Continental Congress of 1774-'76, and in the last year was ordered to France with Dr. Franklin and Arthur Lee on a financial and political mission. Through his influence La Fayette, DeKalb and other Frenchmen were induced to serve in the American cause. Congress recalled him in 1777, as suspicions had arisen that he had persuaded them by profuse promises and had made extravagant contracts. Being obliged by Congress to account for his operations he returned to France for papers to substantiate his declarations, and found the government embittered against him by the publication of certain private dispatches. He died among strangers and poverty, and an investigation, made in 1842, showed that he had been wronged by his country and his political enemies. A large sum of money shown to be due him by the government was paid at that time to his heirs.

DEARBORN, HENRY, GENERAL, born in Hampton, N. H., Feb. 23, 1751, died in Roxbury, Mass., June 6, 1829. He studied and practiced medicine at Nottingham Square (1772), and during his leisure made a study of military tactics, making his knowledge available during the Revolutionary war. The day following the battle of Lexington, with 60 minute men he marched to Cambridge and covered the American retreat at Bunker Hill; he accompanied Arnold's expedition to Canada, where he was taken prisoner in the attack on Quebec; he fought at the battles of Stillwater, Saratoga, Monmouth and Newtown, and at the siege of Yorktown. After the war he was appointed U. S. marshal for Maine, twice elected to Congress, was Secretary of War under President Jefferson, collector of the port of Boston, and in 1812 was advanced to major-general, U. S. A., assigned to the northern department and took part in the war, capturing York (now Toronto) and Ft. George. He was suspected of political intrigues and recalled, but was at once appointed commander of New York city, and in 1822 President Monroe sent him as minister to Portugal. A military post in Chicago was named after Gen. Dearborn, and was evacuated by the United States troops in 1812.

DE ARMOND, DAVID A., a lawyer born in Blair county, Pa., March 18, 1844; educated in the common schools and at Dickinson Seminary, Williamsport, Pa., and was a teacher for several years. In politics he is a Democrat, and served as State senator, circuit judge, and supreme court com-

missioner in Missouri. In 1890 he was elected a Representative from the Twelfth Congressional district of Missouri to the Fifty-second Congress.

DEATH, the cessation of life in animals or plants, when the vital functions cease to perform their work. In a human being death may result from natural decay as in old age, or from failure of the heart, the lungs, or the brain. See *Britannica*, Vol. XVII, p. 686.

DEATH, CIVIL. Death, in a legal point of view, is either natural or civil: the former being the cessation both of physical life and of the legal rights which attach to it; the latter, the cessation of the legal rights whilst the physical life remains. A man was said to be civilly dead in England when he had been attainted of treason or felony, or had abjured the realm, or was banished or became professed in religion by going into a monastery. In these events his property devolved as if he were naturally dead. The doctrine of civil death is now abolished except as to cases of outlawry, in which it seems still to be applicable.

DEATHS-HEAD MOTH, a species of Hawk-moth, or lepidopterous insect of the family *Sphinxidae*, not uncommon in some parts of England and of the Continent of Europe, and very widely distributed over the world (see *Britannica*, Vol. IV, p. 596). With the wings extended, it measures nearly five inches from tip to tip; the color is dark, the yellow body bearing black markings and the thorax pale ones, somewhat resembling a skull, from which its name is derived; the upper wings are mottled with brown, black and yellow. The caterpillar is greenish-yellow, the back speckled with black, with transverse lines partly blue and partly white. It is frequently found feeding on the leaves of the potato in countries where that plant is cultivated. According to popular belief this insect is most frequently seen in times of great mortality.

DEATH VALLEY, a gloomy and desolate district of California, lying in the southeastern part of Inyo county. It is so called because a party of emigrants, attempting to cross the valley in 1849, perished of hunger and thirst. Though near the highest peaks of the Sierra Nevada Mountains, this arid region is everywhere from 150 to 250 feet below the level of the sea.

DEATH-WATCH, a ticking or rapping noise produced by various insects, particularly *Anobium*, in houses. From the fact that the sound is, in consequence of the prevailing quietude, oftenest heard during times of sickness and anxiety, it has been regarded as indicative of approaching death. See *Britannica*, Vol. VI, p. 132.

DEBATABLE LAND, a tract of land, mainly level and of a moory character, on the western border of England and Scotland, between the Esk and Stark. Its name has come from the fact that it was once claimed by both kingdoms, until in 1542 "it was divided by royal commissions appointed by the two crowns," who separated the disputed land by a line drawn between the two rivers from east to west, assigning the upper half to Scotland and the more easterly part to England. The Armstrongs and Grahams, troublesome clans of freebooters, then inhabiting this region, were at the commencement of the 17th century transported to Ireland, and forbidden to return upon pain of death.

DEBATE, an exchange of opinions, differing from conversation in that the speakers succeed each other according to certain regulations, and that the subject is treated formally, and usually with a view to arriving at some practical conclu-



sion. The term is generally applied to the discussion of political representative bodies.

**DEBTS OF VARIOUS COUNTRIES.\*** The following table shows the indebtedness of foreign nations from the latest reports to January, 1892, the figures being given in United States currency:

| Names of Countries.                 | Debt less sinking fund. |                         | Dt. percap.    |                |
|-------------------------------------|-------------------------|-------------------------|----------------|----------------|
|                                     | 1880.                   | 1890.                   | 1880.          | 1890.          |
| <b>Total</b> .....                  | <b>\$23,481,572,185</b> | <b>\$25,636,075,840</b> | <b>\$34.14</b> | <b>\$33.36</b> |
| Argentina Republic....              | 117,165,852             | 284,867,069             | 67.46          | 70.40          |
| Austria-Hungary.....                | 2,224,559,572           | 2,866,339,589           | 58.72          | 70.84          |
| Belgium.....                        | 273,249,276             | 380,504,099             | 49.32          | 63.10          |
| Bolivia.....                        | 29,100,000              | 14,763,367              | 13.87          | 12.38          |
| Brazil.....                         | 445,225,934             | 585,345,927             | 44.83          | 41.80          |
| Chili.....                          | 85,762,665              | 85,192,339              | 37.56          | 31.96          |
| Colombia.....                       | 14,706,679              | 63,451,583              | 3.79           | 16.86          |
| Denmark.....                        | 27,018,985              | 38,073,722              | 13.95          | 15.66          |
| France.....                         | 4,271,732,478           | 4,446,738,338           | 113.47         | 116.53         |
| Dependencies—Africa:                |                         |                         |                |                |
| Madagascar.....                     |                         | 2,827,900               |                | .81            |
| Tunis.....                          | 25,000,000              | 34,881,500              | 12.33          | 23.25          |
| German Empire (prop-<br>er).....    |                         | 77,577,719              |                | 1.57           |
| States of Germany:                  |                         |                         |                |                |
| Alsace-Lorraine.....                | 3,937,265               | 3,837,373               | 2.51           | 2.39           |
| Baden.....                          | 67,553,404              | 71,165,252              | 43.28          | 42.95          |
| Bavaria.....                        | 283,664,534             | 335,503,105             | 53.68          | 60.03          |
| Bremen.....                         | 5,459,025               | 16,217,400              | 34.83          | 89.10          |
| Brunswick.....                      | 6,507,832               | 4,576,174               | 18.83          | 12.94          |
| Hamburg.....                        | 34,334,003              | 59,202,945              | 75.78          | 94.55          |
| Hesse.....                          | 6,107,826               | 7,562,763               | 6.59           | 7.60           |
| Lippe.....                          | 840,200                 | 220,735                 | 2.33           | 1.72           |
| Lubeck.....                         | 3,738,817               | 3,295,709               | 58.81          | 43.10          |
| Mecklenb'g-Schw'rin                 | 10,500,000              |                         | 18.20          |                |
| Mecklenb'g-Strelitz                 | 57,775                  |                         | .58            |                |
| Oldenburg.....                      | 9,257,797               | 9,311,095               | 27.43          | 25.95          |
| Prussia.....                        | 944,115,551             | 1,109,384,137           | 12.61          | 37.03          |
| Saxe-Weimar.....                    | 222,162                 | 423,652                 | .72            | 1.31           |
| Saxony.....                         | 152,539,705             | 143,897,747             | 51.31          | 41.11          |
| Schwarzburg-Lippe.....              | 350,000                 | 150,000                 | 9.89           | 3.83           |
| Thuringian States:                  |                         |                         |                |                |
| Reuss, E. B.....                    | 85,650                  | 70,687                  | 1.69           | 1.13           |
| Reuss, Y. B.....                    | 176,319                 | 63,540                  | 1.74           | .58            |
| Saxe-Altenburg.....                 | 150,968                 | 158,833                 | .97            | .98            |
| Saxe-Coburg-Gotha.....              | 947,340                 | 955,311                 | 4.87           | 4.63           |
| Saxe-Meiningen.....                 | 2,418,340               | 2,550,698               | 11.68          | 11.39          |
| Schwarzburg-Rudol-<br>stadt.....    | 521,550                 | 743,800                 | 6.50           | 8.67           |
| Schwarzb'rg-Sonder-<br>hausen.....  | 806,919                 | 642,631                 | 11.35          | 11.16          |
| Waldeck.....                        | 623,175                 | 568,200                 | 11.03          | 9.92           |
| Wurtemberg.....                     | 91,564,500              | 107,735,500             | 46.45          | 52.93          |
| Great Britain and Ire-<br>land..... | 3,577,746,690           | 3,350,719,563           | 101.52         | 87.79          |
| Dependencies—Asia:                  |                         |                         |                |                |
| Ceylon.....                         | 1,750,000               | 11,184,400              | .69            | 3.76           |
| India.....                          | 671,574,632             | 881,003,592             | 2.64           | 3.27           |
| Africa:                             |                         |                         |                |                |
| Cape of Good Hope.....              | 55,004,660              | 110,817,720             | 43.40          | 77.56          |
| Mauritius.....                      | 3,888,000               | 8,464,662               | 10.77          | 22.92          |
| Natal.....                          | 7,132,180               | 22,028,424              | 19.72          | 45.76          |
| America:                            |                         |                         |                |                |
| Bermudas.....                       |                         | 41,864                  |                | 2.69           |
| Canada.....                         | 175,194,000             | 237,532,212             | 40.51          | 47.51          |
| Australasia and Ocean-<br>ia:       |                         |                         |                |                |
| Fiji.....                           |                         | 678,800                 |                | 5.41           |
| New South Wales.....                | 74,519,685              | 233,289,235             | 99.17          | 214.37         |
| New Zealand.....                    | 128,085,495             | 134,398,305             | 261.49         | 298.01         |
| Queensland.....                     | 66,245,430              | 129,204,750             | 810.25         | 333.46         |
| South Australia.....                | 49,230,000              | 102,177,500             | 176.26         | 321.00         |
| Tasmania.....                       | 8,683,848               | 22,335,345              | 75.05          | 147.46         |
| Victoria.....                       | 102,758,500             | 173,611,005             | 118.91         | 161.63         |
| Western Australia.....              | 1,692,161               | 6,509,736               | 56.96          | 150.23         |
| Greece.....                         | 51,079,492              | 107,236,518             | 25.46          | 49.00          |
| Guatemala.....                      | 4,241,055               | 10,823,836              | 3.46           | 7.59           |
| Hayti.....                          | 16,223,263              | 13,500,000              | 28.36          | 14.06          |
| Hawaii.....                         | 388,900                 | 2,302,235               | 6.71           | 26.57          |
| Honduras.....                       | 29,111,925              | 63,394,267              | 116.45         | 146.77         |
| Italy.....                          | 2,014,237,932           | 2,324,826,329           | 70.78          | 76.06          |
| Japan.....                          | 845,073,865             | 805,727,816             | 9.65           | 7.83           |

\*Chiefly from tables furnished for Eleventh Census of United States. The figures for Canada are the official summary for the fiscal year 1891 (announced Jan. 29, 1892), and give the net debt after deducting all the assets (\$52,000,190). The total debt Dec. 31, 1891, was \$289,899,229. The increase of the net debt during the year was \$275,518.

| Names of Countries.                  | Debt less sinking fund. |               | Dt. percap. |        |
|--------------------------------------|-------------------------|---------------|-------------|--------|
|                                      | 1880.                   | 1890.         | 1880.       | 1890.  |
| Liberia.....                         | 500,000                 | 972,000       | .69         | .91    |
| Mexico.....                          | 117,193,728             | 113,606,675   | 11.83       | 9.98   |
| Montenegro.....                      |                         | 740,200       |             | 3.14   |
| Netherlands.....                     | 382,440,317             | 430,559,858   | 95.81       | 95.56  |
| Dependency—Dutch<br>East Indies..... |                         | 15,381,509    |             | .64    |
| Nicaragua.....                       |                         | 1,711,200     |             | 4.28   |
| Paraguay.....                        | 229,392,000             | 19,633,013    | 956.42      | 59.56  |
| Peru.....                            | 265,050,000             | 382,175,655   | 98.06       | 145.77 |
| Roumania.....                        | 74,189,652              | 180,145,800   | 14.02       | 32.75  |
| Russia.....                          | 3,318,953,000           | 3,491,018,074 | 38.85       | 30.79  |
| Salvador.....                        | 2,078,885               | 6,033,200     | 4.78        | 9.05   |
| Santo Domingo.....                   | 3,682,422               | 19,865,256    | 14.73       | 16.17  |
| Servia.....                          | 7,000,000               | 60,811,330    | 4.19        | 30.50  |
| Spain.....                           | 2,583,209,252           | 1,251,463,690 | 155.87      | 73.85  |
| Sweden.....                          | 56,551,435              | 64,220,807    | 12.39       | 13.53  |
| Norway.....                          | 17,543,837              | 13,973,752    | 9.65        | 7.13   |
| Switzerland.....                     | 5,733,299               | 10,912,925    | 2.06        | 3.72   |
| Turkey.....                          |                         |               |             |        |
| Dependency—Egypt.....                | 491,520,600             | 517,278,200   | 89.08       | 75.88  |

**DECACHORD**, a sort of guitar, similar to the common instrument, only larger in the body and with a broader finger-board.

**DECADENCE**, a term referring to those works of art produced after the school to which they belong has passed the period of its highest excellence. In the days of Pericles, art in all its branches attained its greatest perfection in Greece, and the many exquisite works produced at a later date belong, more or less conspicuously, to the decadence of Greek art. Art and literature culminated in Rome in the days of Augustus, and obvious and rapid decadence followed. The school of the *Renaissance* again came into perfection with Raphael; even the Caracci belong to its decadence, and the decline continued through the *rococo* of Louis Quinze, till throughout Europe art became almost extinct, and in England it probably reached as low a point at the beginning of the reign of George IV as it ever reached in any civilized country.

**DECAGON**, a plane geometrical figure of ten sides. A regular decagon is one with equal sides.

**DECAISNEA**, a genus of plants of the natural order *Berberidaceae*. There is but one species, found in the Himalaya Mountains, where it grows at an elevation of 7,000 feet, and is the only one of its natural order which is not a climber. From the root project several straight branches, like walking-sticks, bearing pinnate leaves two feet in length, which stand out horizontally. The green flowers, growing in racemes, are unisexual, and the yellow fruit, having a length of about four inches and a diameter of one inch, resembles a short cucumber and contains large black seeds. The soft, milky pulp is sweet and wholesome, and is eaten by the inhabitants of the region.

**DECALCOMANIE**, a process of transferring pictures, designs, etc., to various fabrics. A picture slightly covered with cement is pressed tightly against the surface to which it is to be transferred, with a roller or damp cloth, after which the paper may be removed and the picture will remain.

**DECANDOLLE**, ALPHONSE LOUIS PIERRE PYRAMUS, a Swiss botanist, son of Augustin Pyramus (see *Britannica*, Vol. VII, p. 18), born in 1806. In 1831, he became professor of botany in the Academy of Geneva, but resigned a few years later. He was elected president of the International Botanical Congress at London in 1866, and the following year of the congress at Paris. He has held important offices in several scientific societies, and published many valuable books on botany.

**DECANDOLLE**, ANNE CASIMIR PYRAMUS, a Swiss botanist, son of Alphonse L. P. P. DeCandolle, born in 1836. He assisted his father in editing some of his books, and wrote an important work on the arrangement and formation of leaves.

**DECATUR**, a village of Alabama, county-seat of Morgan county, situated at the northern terminus of the South and North Alabama Railroad. It is in the northern part of the State and on the Tennessee River. It has three railroads, an academy, churches, hotels, and lumber mills.

**DECATUR**, a small village of Georgia, the county-seat of DeKalb county. It is five miles northeast of Atlanta, and is the home of many people who do business in that city. It has a railroad, schools, churches, and a furniture factory.

**DECATUR**, a city of Illinois, and county-seat of Macon county (see Britannica, Vol. VII, p. 18). Decatur has seven lines of railway, a system of water works, a large woolen mill, three flouring mills, two breweries, a planing mill, and manufacturing of iron, carriages, engines and boilers, farming implements, furniture, linseed oil, bagging, etc. It has an excellent system of public schools, a high school, a Roman Catholic academy, and a convent. Population in 1880, 9,547; in 1890, 16,841.

**DECATUR**, a village of Van Buren county, Mich., on the Michigan Central Railroad. It has a foundry, tannery, and manufactures lumber and flour.

**DECATUR**, a small village of Mississippi and the county-seat of Newton county.

**DECATUR**, a small village, the county-seat of Meigs county, Tenn., on the Tennessee River.

**DECATUR**, a village, the county-seat of Wise county, Tex., situated 65 miles northwest of Dallas. Flour is here manufactured.

**DECATUR**, STEPHEN, naval officer, born in Newport, R. I., in 1751, died in Frankford, near Philadelphia, Nov. 14, 1808. He fought in the war of the Revolution, commanding successively the *Royal Louis* and *Fair American*. In 1798 he commanded the *Delaware*; captured two French ships; was made commander of a fleet of thirteen vessels in 1800 on the Guadeloupe station. In the following year peace was proclaimed, and he returned to his business in Philadelphia.

**DECATUR**, STEPHEN, son of Captain Decatur, born in Sinnepuxent, Md., Jan. 5, 1779, died near Bladensburg, Md., March 22, 1820. His first voyages were made on board his father's ships. He became a midshipman in 1798, and shipped under Com. Barry on the frigate *United States*, on which he saw much service and earned a noble reputation. He served during the naval war with France, and when peace was declared and Congress reduced the navy to six ships and nine commanders, Stephen Decatur was one of the thirty-six lieutenants retained in the service. When trouble arose with Tripoli and Com. Richard Dale was hastily fitted out with a squadron and sent to bring the Tripolitans to terms, Lieutenant Decatur accompanied him as first-lieutenant of the *Essex*. His most conspicuous act while on this expedition was the burning of the *Philadelphia*. Decatur volunteered for the hazardous task. He entered the harbor of Tripoli, boarded the *Philadelphia*, set fire to her, and then escaped to the *Intrepid* through a rain of shot. "The most daring act of the age," was what Admiral Nelson said of the deed. For this exploit he was made captain. During the war of 1812 Commodore Decatur, commanding the *United States*, captured the British frigate *Macedonian*, and a gold medal was voted him by Congress for the victory. After this war Decatur and Bainbridge were sent with two squadrons to punish the Dey of Algiers, who had been

capturing American merchantmen. Com. Decatur captured the *Mashouda* and *Estedio*, Barbary warships, and made a treaty with Algiers whereby all Christian captives were to be released without ransom, and no more tribute was to be paid to Algiers. To Tunis and Tripoli somewhat similar terms were dictated, and all Europe rejoiced to see the power of the Barbary states broken. Com. Decatur's last public services were rendered as naval commissioner. Com. Barron took exceptions to certain remarks which Com. Decatur made about him. The latter refused to retract, but did all else in his power to restore friendliness, but Barron challenged Decatur. A duel was fought at Bladensburg, March 22, 1820, in which both were wounded, and Decatur died that night.

**DECATURVILLE**, the county-seat of Decatur county, Tenn. It is 60 miles east of Jackson, and has religious and educational institutions.

**DECHAMPS**, AUGUSTE ISIDORE VICTOR (1810-82), a Belgian cardinal. He distinguished himself as a pulpit orator, and in 1865 was consecrated bishop of Namur. In 1879 he became a cardinal priest. He wrote many books on religious subjects.

**DECIDUOUS TREES**, those trees which lose and renew their leaves every year. In cold and temperate countries the fall of leaves in autumn and the restoration of verdure to the woods in spring are among the most familiar phenomena of Nature. For deciduous ornamental trees, see Britannica, Vol. II, pp. 320-21.

**DECIMATION**, a Roman military punishment, rarely inflicted in the present day. When a considerable body of troops committed some grave military offense, which would be punishable with death if committed by an individual, the punishment was awarded to one-tenth of them by lot, instead of to the whole number, in order that the army might not be too much weakened.

**DECIMI**, in music, an interval of ten diatonic degrees, as from C to E, or third above the octave, as which it is always treated in harmony. There are but two cases in which it is treated differently from the third: first, in double counterpoint, where a necessary difference must be made, although the same harmonic rules apply; second, in thorough bass, where the figure 9 rises a degree to 10, instead of falling a degree to 8.

**DECKER**, SIR MATTHEW, a political economist, born at Amsterdam toward the end of the 17th century, died in 1749. In 1702 he went to London, and the next year was naturalized as an English subject; having embarked in commerce, he attained much success. In 1716 he became baronet, three years after which he entered Parliament as member for Bishop's Castle.

**DECLARATION**, in place of an oath. Quakers, Moravians, and Separatists, who object to swearing on religious grounds, have been permitted, by several statutes, to substitute a simple *declaration* or *affirmation*, as it is called, for an oath.

**DECLARATION, DYING**, The rule that secondary or hearsay evidence is inadmissible, suffers an exception in the case of a declaration made by a person under the conviction of his impending death, and who does not survive the trial. Such declarations are of peculiar value for the ends of justice where the party emitting them dies of injuries which are the subject of the prosecution. In a case of murder, the dying declaration of the victim as to the circumstances of the crime is always admitted as evidence on the trial of the prisoner, provided it was deliberately emitted while the deceased retained his faculties, and that it is proved by credible witnesses.



**DECLENSION**, a term in grammar applied to the system of modifications called *cases*, which in many languages nouns, pronouns, and adjectives undergo. How the words declension (Latin, *declinatio*, a declining or leaning away) and case (Latin *casus*, a fall) came to be applied to this kind of inflection, has never been fully understood. There are two methods of expressing the relation of one thing to other things, some languages using for this purpose separate words, called prepositions, while others merely change the termination of the word. Thus, in Latin, *reg* being the root or crude form of the word for "king," *regis* or *rex*, is the word in the nominative case signifying "a king," as subject or agent; *regis*, in the genitive case, "of a king," *regi*, in the dative, "to a king," etc.

**DECLINATION NEEDLE**. A magnetic needle, when suspended or made to rest on a point so that it can move in a horizontal plane, rests in a line connecting two fixed points of the horizon; to which position, when turned aside in any direction, it invariably returns after several oscillations. These two points at certain places on the globe are the north and south points of the horizon, although there is usually a slight deviation from these points. A magnetic meridian is the vertical plane passing through the points on the horizon indicated by the needle; and a similar plane, passing through the north and south points, is called the astronomical meridian of the place. See *Britannica*, Vol. XV, pp. 220, 238.

**DECOLORIMETER**, an instrument by which the power of portions of bone-black or animal charcoal to abstract coloring matter is ascertained.

**DECOMPOSITION**, a term in chemistry signifying the separation of more simple substances from a compound. Thus, the red oxide of mercury, when heated, resolves into mercury and oxygen, thus undergoing decomposition; and water under a current of voltaic electricity is decomposed into hydrogen and oxygen.

**DECORAH**, a city, the county-seat of Winneshiek county, Iowa, on the Upper Iowa River; is the seat of the Norwegian Luther College (Lutheran), and contains churches, banks, mills, and newspaper offices. Three Norwegian periodicals are published here.

**DECORATION DAY**, formerly called memorial day, is the day set apart in the United States for commemorating the services of the soldiers and sailors who lost their lives in the civil war. Orations and processions are made in their honor, and their graves visited and decorated. It is observed by North and South alike, and, in most of the States of the Union, on the same day—May 30th.

**DECREPITATION**, a term applied to the cracking sound heard when a substance like common salt is thrown into the fire. A series of minute explosions occurs, owing to the water between the plates of the crystalline particles becoming expanded by the heat, and ultimately bursting them.

**DECRESCENDO**, in music, the reverse of crescendo; namely, gradual diminishing of the sound. The execution of the decrescendo is very difficult, whether on one or more notes. Like the crescendo, it is also frequently combined with a slight ritardando, especially in descending passages.

**DECRÉTAUX**, FALSE, a collection of Papal letters, canons, etc., chiefly forgeries, ascribed to Isidorus Mercator, and dating from the first half of the ninth century. See *Britannica*, Vol. V, p. 17.

**DEDHAM**, a manufacturing town of Massachusetts, southwest of Boston, the county-seat of Norfolk county, situated on the Charles River. It is a railroad center, and manufactures brooms, woolen

goods and pianos. It contains religious, charitable and educational institutions.

**DE DONIS, THE STATUTE**, a law passed in England A. D. 1285, the object of which was to prevent the alienation of property by one who held a limited interest therein. Similar statutes are now enforced in many of the United States.

**DEED**, a sealed instrument in writing, containing some transfer, bargain or contract. See *Britannica*, Vol. VII, p. 23.

**DEEMS, CHARLES FORCE, D. D., LL. D.**, author, editor, and clergyman, born in Baltimore, Md., Dec. 4, 1820. Graduating at Dickinson College he entered the Methodist ministry, and left pastoral work to become agent in North Carolina for the American Bible Society, and subsequently professor of logic, rhetoric, and natural sciences in North Carolina University and Randolph-Macon College, Virginia. Returning to church work, he held positions of honor in the denomination, and was for a time president of Greensboro College. Since 1865 he has resided in New York city, where he established the Church of the Strangers, of which, at the present writing (1891) he is the pastor. He has been president of Rutgers Female College, and the American Institute of Christian Philosophy, has edited "Frank Leslie's Sunday Magazine," and has done much other literary work. In 1890 he collected many of his formerly published addresses and minor articles on various subjects into a volume called, *Chips and Chunks for Every Fireside*.

**DEEP BOTTOM**, a point on the James River, in Henrico county, Va., 12 miles below Richmond. It was a strategic point during the civil war, and important battles were fought in the vicinity in the year 1864.

**DEEP RIVER**, of North Carolina, rises in Guilford county, follows an easterly course and unites with Haw River at Haywood, to form the Cape Fear River. Deep River is about 130 miles long; coal is found in its banks in Chatham county.

**DEEP RIVER**, a village of Connecticut, situated near the west bank of the Connecticut River, about 35 miles south of Hartford. The chief industry is the manufacturing of hardware.

**DEEP RIVER COAL-BEDS**, a tract of land containing about 40 square miles, lying along the Deep River valley in Chatham and Moore counties, N. C. The coal is of good quality, varying from bituminous to anthracite. Although the coal is abundant, and its location known for over a century, yet it has not been mined. In the same region good copper and iron ores are found.

**DEEP-SEA DREDGING**, a method of exploring the bottom of the ocean, and discovering the forms of life that inhabit great depths. Naturalists employ a dredge composed of a narrow rectangular frame, with two scraping edges, the ends of the frame being of round iron, and each supporting a forked iron arm, each fork being bent round the end piece of the frame at the corners, so as to turn upon it freely. The other end of each arm is furnished with a ring, to which the guided rope is attached. To the back of the frame a bag of strong, open meshes of twine is fastened, by means of holes drilled through the back part of the scrapers, close to the edge, and a plan is adopted to prevent the bag from turning over the mouth of the dredge during its descent. The drag rope is generally attached to one of the arms of the dredge, the other arm being fastened to it by a smaller rope. Heavy weights are used to sink the rope, and to keep the dredge down upon the bottom.

**DEERFIELD**, an historic town in Franklin county, Mass. In 1675 it was the site of "Bloody Brook massacre," and in 1703 the French and

Indians burned the village. It is a railroad centre, and possesses many attractions of scenery for the tourist.

**DEER LODGE CITY**, the county-seat of Deer Lodge county, Montana, situated on a creek of the same name. It is in the western part of the State, about fifty miles southwest of Helena. The region is mountainous, and gold is found here.

**DEERMOUSE**, or **JUMPING MOUSE**, a genus of American rodent quadrupeds allied to mice and to jerboas. See *Britannica*, Vol. XIII, p. 626.

**DEER PARK**, a township of Orange county, N. J., drained by the Neversink River and intersected by the Erie Railroad. The Delaware River bounds it on the southwest.

**DEER STALKING**, the art of pursuing the red deer for the purpose of shooting it with the rifle, "Deer Forests" is the Scottish term for the extensive hilly, treeless regions over which this animal roams.

**DEFAULT**, the non-performance of a duty, whether arising under a contract or otherwise. In practice, the non-appearance of a plaintiff or defendant at court within the time prescribed by law to prosecute his claim or make his defense. When the plaintiff makes default, he may be nonsuited; and when the defendant makes default, judgment by default (*q. v.*) is rendered against him.

**DEFEASANCE**, **DEED OF**, an instrument which defeats the force or operation of some other deed or estate; and that which in the same deed is called a condition, in a separate deed is called a defeasance.

**DEFENDER OF THE MARRIAGE TIE**, an office created by Pope Benedict XIV, in 1741. Its object is, in all cases of actions for divorce, or any attempt to annul the marriage tie, to defend the sanctity of the marriage bond in every feature of its integrity. Marriage, being a sacrament in the Catholic church, is, like the other sacraments, most jealously guarded. The "defender," or officer appointed to defend, is clothed by ecclesiastical authority with the same or similar powers that the prosecuting attorney has in civil law in criminal procedure. It is his duty to protect and defend the sacredness of the marriage tie in every case presented within his jurisdiction. He usually acts as a referee in civil court procedure. The office was instituted in America by the Third Plenary Council in 1884, and is now extended until each Catholic diocese has its own "defender" ecclesiastically appointed. The first appointment in the United States, resultant on the action of Baltimore Council in 1884, was Rev. Dr. Burtzell, who was made "defender," etc., by Archbishop Corrigan, and elected by the synod of 1886.

**DEFIANCE**, capital of Defiance county, Ohio, on the Maumee River, about fifty miles southwest of Toledo, and about forty-four miles northeast of Fort Wayne, Ind. It is on the Wabash Railroad, the Wabash and Erie Canal, and the Baltimore, Pittsburgh and Chicago Railroad. It publishes two weekly newspapers, and contains a female seminary and several manufactories.

**DEFICIENT NUMBERS**, numbers whose aliquot parts, or factors, added together, make a sum less than the number itself; thus 16, whose parts, 1, 2, 4, 8, make together but 15, is a deficient number.

**DEFILE**, a military term applied to any passage which can be traversed by troops in column, only with a narrow front. A defile is any place where free movement is obstructed, and it is a "pass" when it cannot be avoided without a long circuit.

**DEFLAGRATION** is the rapid combustion of ignited charcoal where a nitrate, such as nitrate of potash, or a chlorate, such as chlorate of potash, is

thrown thereon. As chlorates do not occur naturally, it follows that deflagration with a natural salt indicates a nitrate; and if the deflagration be accompanied by a violet flame, it is characteristic of nitrate of potash (ordinary nitre or saltpeter); and if by a strong yellow flame, it is indicative of nitrate of soda (cubical nitre).

**DEFLECTION**, generally a change of course, or line of motion of a moving body. The word deflection is also used as synonymous with diffraction. Also the depression of the upper surface of a beam below its original level. Also used to describe that variation of a projectile from the absolutely straight line it would pursue, were there no disturbing causes, as wind, etc.

**DEFORCEMENT**, in English law, an abatement, intrusion, disseizin, or discontinuance, or any other wrong whatsoever, whereby he that has the right to the freehold is kept out of possession.

**DEFOREST**, **JOHN WILLIAM**, soldier and author, born in Humphreysville (now Seymour), Conn., March 31, 1826. His education was largely obtained abroad. During the civil war he served as captain of volunteers, quitting the service with the rank of major. Before the war he had written several books, and stories for periodicals; and now being on the field of operations, he sent to "Harper's Monthly," descriptions of many battles fought in Louisiana and Georgia. Since 1868 he has resided principally in New Haven, Conn. He is the author of many essays, poems, and some fifty short stories.

**DE FOREST**, **ROBERT E.**, lawyer, born in Guilford, Conn., in 1845. He was a farmer until 1863, when he entered Yale College and took the name De Forest in order to receive the benefit of the De Forest fund for deserving students. His name until then had been Griswold. He graduated at Yale College in 1867. He was elected a member of the State House of Representatives in 1881, and a member of the State Senate in 1883; afterwards was elected mayor of Bridgeport, which office he held when, in 1890, he was elected a Representative from the Fourth Congressional District of Connecticut to the 52d Congress. In politics he is a Democrat.

**DE FUNIAK SPRINGS**, a village of Florida, county-seat of Walton county, the seat of the Florida Chautauqua and State Normal School.

**DEGOLLADO**, **SANTOS**, a Mexican general, born in Morelia, Mexico, July 30, 1819, died in June, 1861. In 1854 he took part in the revolt against Santa Anna, and raised an army of 2,000 men, who marched under the command of Gen. Juan Alvarez. This general deposed Santa Anna and became president, while Degollado, belonging to the liberal party and opposed to the church party, devoted his energies to the establishment of the government. He was elected governor of his native State, Michoacan, 1859, and then elected to Congress. In the meantime the Church party had become powerful and aggressive; it had sent an army into the field, and now threatened the government. Its latest outrage was the capture and unprovoked assassination of Melchor Ocampo, the friend of Degollado. The latter asked permission to lead an expedition against the rebels. He started out with 150 men, fell into an ambush and was assassinated.

**DEGREE**, in music, the difference of position or elevation of the notes on the lines and spaces. When notes are on the same line or space, they are on the same degree, even though one of the notes should be raised by a sharp or lowered by a flat. When two notes follow diatonically, so that one of them is on a line and the other on a space adjoining, the interval is of one degree. Subtracting one from an interval gives the degrees which separate



the two notes; thus, a third is separated by two degrees, a fourth, by three, etc.

**DEGREE OF LATITUDE**, the space along the meridian through which an observer must pass to alter his latitude by one degree; that is, in order to see the same star one degree nearer to or farther from the zenith. This space must be found by actual measurement; and owing to the earth being an oblate spheroid, and not a sphere, it varies with the place of observation—the degrees being generally longer toward the poles, where the earth is flatter, and shorter at the equator, where the earth is more curved. If the earth were a sphere, a degree would be exactly one 360th part of the meridian. As it is the length of a degree of latitude depends on the latitude of the place. From various observations made at different times and places, dating as far back as the time of Eratosthenes (250 B. C.), tables have been constructed showing the length of degrees at different latitudes.

**DEGREE OF LONGITUDE**, the space between two meridians that make an angle of one degree at the poles, measured by the arc of a circle parallel to the equator passing between them. It is clear that this space is greatest at the equator, and vanishes at the poles; and it can be shown that it varies with the cosine of the angle of latitude.

**DE HAAS, WILLIAM FREDERICK**, born in Rotterdam, Holland, in 1830, died in Fayal, Azores, July 16, 1880. He was a marine painter, who studied in his native city and emigrated to America. Some of his paintings were: *Sunrise on the Susquehanna*; *Fishing-Boats off Mt. Desert*; *Boon Island*; *Coast of Maine*; and *Narragansett Pier*.

**DE HAAS, MAURICE FREDERICK HENDRICK**, born in Rotterdam, Holland, in 1832; the brother of William F. De Haas, and, like him, a marine painter. He studied art in his native country, made sketches of Dutch and English coasts, and was appointed artist of the Dutch navy. In 1859 he came to New York, where he became an associate of the National academy and one of the original members of the American Water-colors Society. Among his works are: *Storm off the Isle of Jersey*; *After the Wreck*; *Off the Coast of France*; *Sunset at Sea*; *Drifting Ashore in a Fog*; *Early Morning off the Coast*; and *Farragut Passing the Forts*.

**DE HAVEN, EDWIN J.**, Arctic explorer, born in Philadelphia, Pa., in 1819, died there Oct. 2, 1865. At the age of ten he entered the marine service, continuing in it for thirty-six years. From 1839 to 1842 he was with Wilke's exploring expedition, and for sixteen months he was in command of the first expedition sent by Henry Grinnell in search of Sir John Franklin.

**DEIANIRA**, daughter of Ceneus; she poisoned the tunic of Hercules with blood of the centaur Nessus, preserved under the impression of its being a love charm. See *Britannica*, Vol. XI, p. 726.

**DEI GRATIA** (Lat., "by the favor of God"), a formula taken from several apostolical expressions in the New Testament. It is believed to have been first formally used by the bishops at the council of Ephesus, A. D. 431. Afterwards it came to be appended by archbishops, bishops, abbots, abbesses, deans, monks, and even chaplains to their titles, in letters, and other documents, as an humble expression of dependence on the Most High. After the middle of the thirteenth century, when the sanction of the Pope began to be considered necessary to ecclesiastical offices, the higher clergy wrote *Dei et Apostolicæ sedis gratia*, "by the favor of God and the apostolic see." At a later period many of them preferred to write, *Miseratione*

*divina, permissione divina*, and the like; but they still continued to be styled by others *Dei Gratia*.

**DE KALB**, a city in the northern part of Illinois, county-seat of De Kalb county, about sixty miles west of Chicago. It has manufactories of plows, furniture, gloves, and mittens.

**DE KALB, JOHN BARON** (1721-80), a Bavarian general, who entered the French army, and, accompanying Lafayette to America, fought under Washington and Gates.

**DE KAY, GEORGE COLEMAN**, a naval officer, born in New York city in 1802, died at Washington, D. C., Jan. 31, 1849. He volunteered in the war of the Argentine Republic against Brazil, and won a captain's commission. He commanded the ship *Macedonian*, which during the famine of 1847 carried supplies to the sufferers in Ireland; it was through his efforts that Congress allowed the employment of a Government frigate for such a purpose. In 1833 he was married to Janet, only child of Joseph Rodman Drake. They became the parents of four sons: Joseph Rodman Drake, born Oct. 21, 1836, died June 9, 1886. He won the rank of lieutenant-colonel in the civil war. George Coleman, Jr., born Aug. 24, 1842, died June 27, 1862. He was a lieutenant of artillery and member of Gen. Thomas Williams's staff. Sidney, born March 7, 1845. He joined the 71st N. Y. volunteers, and was on the staff of Gens. B. F. Butler, Devens and Terry, and after the civil war fought in the Greek army against the Turks. Charles, born July 25, 1848. He became an author, publishing *The Bohemian*; *Hesperus*; *Vision of Nimrod*; *Vision of Esther*; *Manmatha*, his best work; and *Love Poems of Louis Bar-naval*.

**DE KAY, JAMES ELLSWORTH**, naturalist, born in Lisbon, Portugal, in 1792, died in Oyster Bay, Long Island, N. Y., Nov. 21, 1851. He studied for the medical profession in Edinburgh; visited Turkey with his father-in-law, Henry Eckford; was sent by the latter on business connected with the navy to the South American countries, and on his return settled at Oyster Bay. During the cholera outbreak in New York he gave his services to the victims. He wrote for the press; was engaged in a State survey—the departments of botany and zoölogy being assigned him. His researches are in five volumes of the *New York State Survey*. He also published *Travels in Turkey*.

**DEKKER, EDWARD DOUWES**, a Dutch author, born in 1820. He has published two dramas, several works on the Dutch Indies, and various other popular books.

**DE KOVEN, JAMES**, clergyman, born in Middletown, Conn., Sept. 19, 1831, died in Racine, Wis., March 9, 1879. He was a graduate of Columbia, and the General Theological Seminary and was made rector at Delafield, Wis., of the church of St. John Chrysostom. The care of the school, St. John's Hall, was placed in his hands, and in 1859 he was elected warden of Racine College, and introduced various innovations, such as the wearing of the Oxford cap and gown by teachers and pupils, and the first surpliced choir west of New York. He did much for the upbuilding of this college by the extension of its grounds and the erection of a new chapel and other buildings. He declined the call to be the assistant rector of Trinity church, New York, and a little while before his death he was chosen rector of St. Mark's, Philadelphia. He was a brilliant conversationalist and a powerful pulpit orator.

**DE KROYFT, SARAH HELEN ALDRICH**, author, born at Rochester, N. Y., Oct. 29, 1818. She received an excellent education, and graduated at the Lima Seminary in New York. In 1846 she was

married to Dr. William De Kroyft of Rochester, but he was killed by a fall from his carriage on his wedding-day. Within a month after the accident she became totally blind and never recovered her sight. She went to New York and studied in the institution for the blind. She there began to write for newspapers and was quite successful; a collection of letters, entitled *A Place in Thy Memory*, became so popular that 200,000 copies were sold. *Little Jakey*, a true story of a blind boy, was her best sketch. She has delivered in many cities a lecture entitled *Darwin and Moses*.

DEL (*Artocarpus pubescens*), a tree of Ceylon, valued for its lumber, which is used in building houses and ships. It is of the same genus as the bread-fruit.

DELAFIELD, EDWARD, an American physician and surgeon, born at New York, May 17, 1812, died Feb. 13, 1875. He graduated at Yale, and studied medicine in New York and London. He assisted in founding the New York Eye and Ear Infirmary, and the New York Ophthalmological Society, of which he afterwards became president, and was president also of Roosevelt Hospital, and of the New York College of Physicians and Surgeons.

DELAFIELD, FRANCIS, M. D., born in the city of New York, Aug. 3, 1841, educated at Yale, and in the New York College of Physicians and Surgeons. He has been surgeon in the New York Eye and Ear Infirmary, physician to Bellevue Hospital, professor of pathology and practical medicine in the New York College of Physicians and Surgeons, and, among other medical works, has published a *Hand-book of Post-Mortem Examination*.

DELAFIELD, RICHARD, soldier, born in New York city, Sept. 1, 1798, died in Washington, Nov. 5, 1873. After graduating at West Point in 1818, he became a military engineer, and was appointed to duty on the northern boundary survey of the United States under the Ghent treaty. Subsequently he was employed on the defenses of Hampton Roads, the Mississippi, Delaware, and Hudson Rivers. He was twice superintendent of West Point. From 1861 to 1863 he served on the staff of Gov. Morgan, of New York; from 1864 to 1866 had charge of the bureau of engineers of the war department, was inspector of the Military Academy, and in 1866 was retired from service.

DE LANCEY, JAMES (1703-60), an American jurist, born in New York city, and educated in England, where he studied law. He became chief justice of the Supreme Court in New York, lieutenant-governor of the State, presided over the first Congress held in the colonies, and was the first person on whom the freedom of the city of New York was conferred. He was one of the founders of King's College. The De Lancey family was prominent in Revolutionary times, and several of its members were men of remarkable talent.

DE LANCEY, WILLIAM HEATHCOTE (1797-1865), an American P. E. bishop. He was ordained deacon in 1819, and priest in 1822. From 1823 to 1833 he was provost of the University of Pennsylvania. In 1835 he became rector of St. Peter's church, Philadelphia, having been assistant for the two previous years. He was chosen bishop of Western New York in 1839, and in 1852 was a delegate to the 150th anniversary of the London Missionary Society—this being the first occasion on which the American church was formally represented in England.

DELANO, COLUMBUS, Congressman, born in Shoreham, Vt., June 5, 1809. He became an eminent criminal lawyer in Ohio, was elected to the legislature, and to Congress. He was a delegate to the convention which nominated Abraham Lincoln to

the presidency. President Grant appointed him commissioner of internal revenue. From 1870 to 1875 he was Secretary of the Interior.

DE LA RAME, LOUISA ("Ouida"), an English novelist, born in 1840. Her books are full of exaggerations and improbabilities, and are written in a meretricious style.

DELAVAN, a railroad town of Tazewell county, Ill., situated near the center of the State, about 157 miles southwest of Chicago. It has a variety of manufactories, a park, and a high school.

DELAVAN, a village in the southern part of Wisconsin, situated in Walworth county, on Turtle Creek, 58 miles southwest of Milwaukee. A State institution for the deaf and dumb is located here.

DELAVAN, EDWARD CORNELIUS, temperance reformer, born in Schenectady county, N. Y., in 1793, died in Schenectady, Jan. 15, 1871. He acquired a large fortune in the wine business and owned considerable real estate in Albany, including the Delavan house, which was erected by him. He became interested in the temperance cause, and with the assistance of Dr. Eliphalet Nott he organized in Schenectady a State temperance society; he lectured, wrote, and gave largely for the cause. In 1835 he charged an Albany brewing company with using filthy water for malting. Suit for libel and other suits were brought against him, but he won the first and the others were dropped. He published a temperance periodical, which became later the "Journal of the American Temperance Union."

DELAWARE, one of the Middle States, and, with the exception of Rhode Island, the smallest State in the Union. For its geographical location, history, map, and earlier statistics, see *Britannica*, Vol. VII, pp. 44-45. According to the official census of 1890 the area of Delaware was 2,050 sq. miles, and the population 168,493. The population by counties was as follows:

| Counties,       | 1880.   | 1890.   |
|-----------------|---------|---------|
| Kent.....       | 32,874  | 32,664  |
| New Castle..... | 77,716  | 97,182  |
| Sussex.....     | 36,018  | 38,647  |
| Total.....      | 146,608 | 168,493 |

Agriculture is the chief industry in the middle and southern portions of the State, while manufacturing is the prevailing industry in the northern part. The agricultural productions are chiefly Indian corn, wheat, oats, and fruits, peaches being raised in immense quantities. The principal manufactured products are flour, boots and shoes, carriages and wagons, lumber, iron, leather and bricks. In 1888 the total acreage of Indian corn was 220,927, yielding 3,844,000 bushels, valued at \$1,691,360; wheat, 94,790 acres, yielding 1,194,000 bushels, valued at \$1,194,000; rye, 857 acres, yielding 8,000 bushels, valued at \$4,628; oats, 21,839 acres, yielding 450,000 bushels, valued at \$157,500; potatoes, 4,224 acres, yielding 317,000 bushels, valued at \$152,064; hay, 56,240 acres, yielding 66,363 tons, valued at \$862,719. On Jan. 1, 1890, Delaware contained 23,000 horses, 4,184 mules, 29,543 milch cows, 26,866 head of oxen and other cattle, 22,294 sheep, and 51,185 swine.

The educational system was entirely remodeled in 1875, and is now under the direction of a State board of education and a general superintendent. Instruction is given to teachers by the Wilmington Normal School; and higher education is afforded by



Delaware College at Newark, and the Wesleyan Female College at Wilmington.

The following is a complete list of the governors of the State to and including 1891:

|                                |                               |
|--------------------------------|-------------------------------|
| Joshua Clayton.....1789-96     | Caleb P. Bennett.....1832-37  |
| Gunning Bedford.....1796-97    | Charles Polk.....1837-39      |
| Daniel Rogers.....1797-98      | Wm. B. Cooper.....1840-44     |
| Richard Bassett.....1798-1801  | Thomas Stockton.....1844-46   |
| James Sykes.....1801-02        | Joseph Maul.....1846          |
| David Hall.....1802-05         | William Temple.....1846       |
| Nathaniel Mitchell.....1805-08 | William Thorp.....1846-51     |
| George Truett.....1808-11      | William H. Ross.....1851-55   |
| Joseph Haslett.....1811-14     | Peter F. Cansey.....1855-59   |
| Daniel Rodney.....1814-17      | William Burton.....1859-63    |
| John Clarke.....1817-20        | William Cannon.....1863-65    |
| Jacob Stout.....1820-21        | Gove Sausbury.....1865-69     |
| John Collins.....1821-22       | James Ponder.....1869-75      |
| Caleb Rodney.....1822-23       | John P. Cochran.....1875-79   |
| Joseph Haslett.....1823-24     | John V. Hall.....1879-83      |
| Samuel Paynter.....1824-27     | Chas. C. Stockley.....1883-87 |
| Charles Polk.....1827-30       | Benj. T. Biggs.....1887-91    |
| David Hazzard.....1830-33      |                               |

**DELAWARE**, a city, and the county-seat of Delaware county, Ohio, on the Olentangy River. Among its educational institutions are the Ohio Wesleyan University and the Ohio Wesleyan Female College. The city is well built, has medicinal springs in its vicinity, and has many mills and factories. Among the articles manufactured are flour, beer, chairs, iron fences, carriages and lumber.

**DELAWARE**, or **DE LA WARR**, THOMAS WEST, LORD, died at sea, June 7, 1618. He became in 1602 third Lord Delaware, and seven years later was appointed governor of Virginia, and the following year he arrived at Jamestown. The colonists were discouraged, and on the point of sailing for England, but his coming and prudent measures inspired them with hopes of better times. The colony flourished under his management. He built and named the forts Charles and Henry, established the settlement where Hampton now is, and discovered the river called, in his honor, the Delaware. Illness obliged him to go back to England, but so much was he respected that the colonists petitioned him to return. While attempting to do so he died, and was buried at sea.

**DELAWARE CITY**, a village in the northern part of Delaware, situated in New Castle county, on the Delaware River, 40 miles below Philadelphia. It is at the eastern terminus of the canal which connects the Chesapeake and Delaware bays.

**DELAWARE INDIANS**. See **INDIANS**, **AMERICAN**, in these Revisions and Additions.

**DELAWARE WATER GAP**, a village of Monroe county, Pa., 92 miles northwest of New York and 57 miles southeast of Scranton. It is a summer resort famous for the beauty of its scenery. The Delaware River at this point breaks through a gorge in the Kittatinny Mountains, and the steep, rocky banks rise nearly 1,300 feet above the water.

**DELBÜCK**, MARTIN FRIEDRICH RUDOLPH, a German statesman, born in 1817. He practiced law at the bar of Halle in 1839-40, and later entered the civil service, becoming assistant in the ministry of finances, then in that of commerce. In 1859 he became a director of the division of commerce and industry, and in acknowledgment of his services was made president of the federal chancery in 1867. He afterwards held various important public offices, but retired to private life about 1880.

**DELECTUS PERSONÆ**, in some legal relations, a choice of the person, for some qualification possessing value in the eyes of one of the parties to the contract, is assumed; and the individual so chosen cannot consequently transmit his rights and obligations to another without the consent of the person who is supposed to have chosen him.

**DELEGATE**, one sent with power to transact business for another. The members of the First Continental Congress were delegates, and those now sent to represent the Territories are also called delegates.

**DELEGATION**, the term formerly applied in Lombardy, Venice, and the States of the Church to a province and to its governing court. Lombardy formerly contained nine delegations and Venice eight, each of these being presided over by a delegate, a vice-delegate, and others in lower positions. By a decree of 1816 seventeen delegations were established in the States of the Church, but the number was several times changed. Delegates were directly appointed by the Pope, and were always prelates. If the delegate was a cardinal he was called a legate, and his province a legation. In Spain, the superintendents of the police administration of a province are called *Delegados del fomento*.

**DELEPIERRE**, JOSEPH OCTAVE (1802-79), a Belgian historian and antiquary. He practiced law at Brussels, and in 1849 was appointed secretary of legation and consul-general at London. He wrote works on historical topics.

**DELESCLUZE**, LOUIS CHARLES, the leading spirit of the French commune, born in 1809, died from a shot received on the barricade in the Rue d'Angoulême, May 28, 1871.

**DELFI**, a heraldic charge representing a square sod or turf; the term is derived, as is supposed, from the verb to delve or dig. A *delf tenne* is the appropriate abatement for one who revokes his challenge, or otherwise goes back on his word.

**DELHI**, a village and county-seat of Delaware county, Iowa, on the Maquoketa River, 40 miles southwest of Dubuque.

**DELHI**, a village and county-seat of Delaware county, N. Y., on the west branch of the Delaware River. It contains manufactories of sash and blinds, carriages, and woolen goods.

**DELILAH** ("the languishing"), a Philistine woman who took advantage of Samson's love for her, and by her flattery won from him the secret that in his locks lay his God-given strength. She treacherously betrayed him into the hands of his enemies, after having cut off his hair while he lay asleep.

**DELIQUESCENCE**, the term given to the property which certain substances have of absorbing moisture from the air, and becoming damp, even running into liquid. Examples of such substances are caustic potash, and the chlorides of calcium and magnesium.

**DELIRIUM EMBRIOSUM**, a term intended to denote a form of acute mania, of which the exciting cause is intoxication. It is often mistaken for delirium tremens, and in criminal cases has probably been frequently dealt with as such. A single fit of intoxication, or a short period of intemperance—often occurring periodically—gives rise to this delirium in those who have inherited mental excitability or received previous injury of the head, and who may have experienced some cause for depression of spirits. An uncontrollable desire for drink characterizes it; this thirst, when gratified, only leading to further imperative demands, until the thing is loathed, and a fit of sickness brings about recovery.

**DELIRIUM NERVOSUM**, or **TRAUMATICUM**, a term applied by Baron Dupuytren, the famous French surgeon, to an attack of delirium with tremors, which often supervenes on severe bodily injuries, as burns, fractures, and gunshot wounds. Some have considered it identical with delirium tremens; but it only simulates that affection, being but a symptom of a sympathetic typhoid fever.

**DELITZSCH, ADOLF FRANZ**, theologian and Hebraist, born at Leipzig in 1813, died in 1890. He studied at the University of Leipzig, and in 1846 became professor of theology at Rostock, whence he was called to Erlangen in 1850, and back to Leipzig in 1867. He held a foremost place among conservative German theologians, while his great personal influence over a generation of Leipzig students, and a series of learned books, contributed to extend a knowledge of Old Testament exegesis not only in Germany, but in England and America. His new commentary on Genesis (1887) marked a large concession to the modern critical theory of the Pentateuch.

**DELIUS, NICOLAUS**, a German author, born in 1813. In 1841 he began lecturing; in 1855 became professor extraordinary in the University of Bonn, and in 1865 was made full professor. He gave particular attention to romance literature, and especially to Shakespeare, being noted as a critic of that author. He has published numerous criticisms and other works.

**DELLA CRUSCAN ACADEMY**, an institution founded in 1582 in Florence, Italy, with a view to purifying and perfecting the Tuscan tongue. See *Britannica* Vol. I, p. 73.

**DELLA CRUSCAN SCHOOL**. About the year 1785 there was published *The Florence Miscellany*, a collection of verses written by a number of English residents at Florence as an amusement during their idle hours. The insipidity, affectation, and fantastic silliness of the productions transcend all belief, but at that period poetry was at so low an ebb that a crowd soon admired and began to imitate them. The Della Cruscan, taking their name from the academy at Florence, now began to print their works in England, mainly in two daily newspapers, called "The World" and "The Oracle." "While the epidemic malady was spreading from fool to fool," as Gifford says, "one of the brotherhood, a Mr. Robert Merry, came from Florence, and immediately announced himself by a sonnet of Love," which was answered by a certain Anna Matilda, who (as was the custom) praised it immoderately in language even more absurd than Merry's own. Gifford says: "The fever now grew to a frenzy; Laura, Maria, Carlos, Orlando, Adelaïd, and a thousand other nameless names caught the infection, and from one end of the kingdom to the other all was nonsense and Della Crusca."

**DELMAR, ALEXANDER**, political economist, born in New York city, Aug. 9, 1836. He has been editor of several New York papers, and in 1864 established the *Social Science Review*. He organized the United States bureau of statistics, attained distinction as a mining expert, and is the author of *Money and Paper Money*; *Treatise on Taxation*; *Essays on Political Economy*; *The National Banking System*; *What is Free Trade?* *Letter on the Finances*; and *History of Money*.

**DEL NORTE**, capital of Rio Grande county, Colo., on the Rio Grande. It is one of the chief towns of southwestern Colorado, and is situated at an elevation of 7,807 feet, amid a beautiful surrounding scenery. This place is the base of supplies for the San Juan mines.

**DE LONG, GEORGE WASHINGTON**, explorer, born in New York city, Aug. 22, 1844, died in Siberia, Oct. 30, 1881. He was educated in the schools of Brooklyn, N. Y., and the United States Naval Academy, graduating in 1865. He served with the European squadron in the South Atlantic fleet, and in the North Atlantic, and in 1873 was a member of the expedition which went on the *Juniata* in search of the *Polaris*. In 1879 De Long was sent on an arctic exploration expedition in command

of the *Jeannette*. The vessel left San Francisco July 8, and two months later became inclosed in an ice-pack, which twenty-two months later crushed the ship. The crew then started southward, traveling by boats and sledges until they reached Thaddeus Island, one of the New Siberian group, where they entered three boats, commanded respectively by De Long, Lieut. Chipp, and Engineer Melville. A storm separated the boats, and De Long and fourteen men, after traveling 2,800 miles, reached the mouth of the Lena. Here they abandoned the boat and traveled over land until Oct. 9, when they could go no farther, and with the exception of two men sent for help, perished from the effects of cold and starvation. Search was made for De Long without success; but in March, 1882, it was renewed and the dead bodies were discovered on the 23d of the month. The records in De Long's journal were brought down to October 30, when it appears that two men besides himself were living. Their bodies were brought to New York and buried with appropriate ceremonies.

**DELORME, MARION** (c. 1612-c. 1651), a Frenchwoman who became notorious in the 17th century. She made her house the rallying-point of the chiefs of the *Frondeurs* during the first disturbances of that party, and for this Mazarin was about to imprison her, when she suddenly died. Victor Hugo made her the subject of one of his historical dramas.

**DELPHI**, a city and county-seat of Carroll county, Ind., on the Wabash River, and on the Wabash and Erie Canal. The water-power is excellent, and is utilized in running paper and planing mills.

**DELPHIN CLASSICS**. See *Britannica*, Vol. II, p. 657.

**DELPHINORHYNCHUS**, a genus of cetacea of the family *Delphinidae*, resembling the true dolphin in having one dorsal fin, but the beak is not distinguished from the forehead by a furrow. One species about eight feet in length, black on the upper surface and reddish beneath, known as *Delphinorhynchus Bredanensis* or *Delphinorhynchus rostratus*, has been washed ashore on the Atlantic coast of France. *Delphinorhynchus corohatus*, a much larger species, from thirty to thirty-five feet long, is a whale found in high northern latitudes, numerous flocks having been seen among the ice-islands, near Spitzbergen.

**DELPHOS**, a village of Van Wert county, O., situated on the Miami canal. It contains a Franciscan convent, and manufactories of barrels, staves, and wheels.

**DELTA**, the parish-seat of Madison parish, La., situated on the Mississippi River, opposite Vicksburg.

**DELUNDUNG**, a carnivorous animal found in the forests of Java, referred to the family *Viverridae*, although it is regarded as a connecting link between that family and *Felidae*. It is prettily streaked and spotted, and has a slender form and a long cylindrical tail.

**DELVINO**, a town in the province of Albania, European Turkey. The women wear a peculiar garb consisting of a long, white wrapper extending from head to foot, which makes them appear like animated monumental figures.

**DEMAVEND, MOUNT**, an extinct volcano in Persia, forming the highest peak of the Elburz chain, which separates the low shores of the Caspian Sea from the high table-land of Persia. The summit is covered with a deposit of sulphur, which is brought to the plains in bags to be disposed of as an article of commerce. No European ascended this peak until 1837. The Russian survey ascertained the height to be 18,600 feet. See *Britannica*, Vol. V, pp. 176, 177.



DEMBEA, TSANA, TZANA, or TANA LAKE, situated in Abyssinia, 6,000 feet above sea-level, its southern part being traversed by the Blue Nile. It contains many beautiful islands. See *Britannica*, Vol. XVIII, p. 507.

DEMESNE, in the law of England in the present day, the right which the owner in possession of lands in fee simple has in his estate. But the original signification of *demesne* was that portion of the lands of a manor which the lord of the manor reserved for his immediate use and occupation.

DEMESNE, ANCIENT, in English law, a tenure by which all manors belonging to the crown, in the reign of William the Conqueror, were held. The number, names, etc., of these were all entered in a book called "Domesday Book."

DEMETZ, FREDERIC AUGUSTE (1796-1873), one of the founders of the colony at Mettray, in France, for the reformation of juvenile offenders.

DEMI, or DEMY (half). In heraldry, an animal is said to be *demi* when only the upper or fore half of it is represented. In inanimate objects the dexter half per pale is usually intended when it is said to be *demi*, though a *demi-fleur-de-lis*, for example, may be a *fleur-de-lis* divided per fess.

DEMI-BASTION, in fortification, a kind of half-bastion, which frequently terminates the branches of a crown-work or horn-work, and which is also occasionally used in other places.

DEMIDOFF, NIKITA, the founder of the family bearing his name. See *Britannica*, Vol. VII, p. 59; Vol. XVII, p. 369.

DEMI-LUNE, in fortification, a work constructed to cover or defend the curtain or wall of a place, and the shoulders of the adjoining bastions. It is composed of two faces, forming a salient angle toward the open country outside the place. It has two demi-gorges, formed near the counter-scarp and is surrounded by a ditch.

DEMING, a city of New Mexico, and an important railroad center, situated on the south bank of the Rio de los Mimbres, about fifty miles below Silver City. It was founded in 1881 in the center of an extensive stock-range. Lead and silver are found in the vicinity in abundance. A United States custom-house is located here, and there is a thriving trade with the mining camps of the district and with Mexico.

DEMIR-HISSAR ("Iron Castle"), a fortified town of European Turkey, situated on a tributary of the Struma, at the base of an old fort-crowned hill. Here are several mosques and a Greek church.

DEMISEMIQUAVER, in musical notation, a note equivalent in time-value to half a semiquaver, or the 32d part of a semibreve.

DEMOCRATIC-REPUBLICAN PARTY. See UNITED STATES, *Britannica*, Vol. XXIII, pp. 729-830.

DEMOGEOT, JACQUES CLAUDE, a French author, born in 1808. He was professor in the colleges of Beauvais, Rennes, Bordeaux, and Lyons, and in 1834 became professor of rhetoric at the Lycée Saint Louis in Paris. He is the author of text-books on French literature and many other works.

DEMOISELLE (*Anthropoides*), a genus of birds of the crane family, differing from the true cranes in having the head and neck quite feathered, and the *tertails* of the wings elongated and hanging over the tail, so as in some species to touch the ground. The Demoiselle, or Numidian crane (see *Britannica*, Vol. VI, p. 546), is about three feet long from the point of the bill to the tip of the tail, and about three and one-half feet high from the top of its head. Its plumage is gray except for two white tufts formed by elongation of the ear coverts,

and a tuft of blackish feathers, which hangs from the breast. Demoiselle is also a French name for the dragon-fly.

DEMONSTRATION, in mathematics, a proof of any proposition which excludes doubt, as the demonstrations of the propositions in Euclid. The method of demonstration in mathematics is the same with that of drawing conclusions from principles in logic, and is usually syllogistic, the premises being omitted to be stated at each turn. The principle of *reductio ad absurdum* is also employed.

DEMONSTRATION, in military operations, an apparent movement or manœuvre, the chief object of which is to deceive the enemy and induce him to divide his force, as if to meet dangers from various quarters. When thus divided and weakened he may be attacked with greater chance of success.

DEMULCENTS, bland and lubricating liquid substances, taken by the mouth, for the purpose of soothing irritation of the mucous membranes, and promoting the dilution of the blood and the increase of the secretions. Demulcents are chiefly composed of starch, or gum, or of substances containing these dissolved in water; sometimes also of oily matters, or the white of eggs, and other albuminous or gelatinous substances largely diluted. The decoction of *Althæa*, or marsh-mallow, is a favorite form of demulcents.

DENDRERPETON, a small lizard-like batrachian, found by Lyell and Dawson in Nova Scotia, in the hollow trunk of an upright *sigillaria*. The tree was about two feet in diameter, and consisted of an external cylinder of coal, and an internal axis of mud and sand cemented together with fragments of wood into a solid rocky mass. In this were discovered the shell of a *pupa*, the first air-breathing mollusk met with in the coal, and the bones of a small reptile, probably two and a half feet long. It was described and figured by Owen as *Dendrerpeton Acadianum*. He showed it to be nearly related to *Archegosaurus*, from the plicated structure of the teeth, the sculpturing of the cranial plates, and the structure and proportion of certain limb-bones. It receives its name, "tree-lizard," from its having been found in a tree; and this was supposed to show that it had arboreal habits; it is, however, probable that the remains had been washed in with the mud and sand, which form the matrix in which they are preserved.

DENDRITE, the name given to a peculiar branching mineral crystallization on the surfaces of the fissures and joints or in the substance of rocks, having the appearance of moss, and often mistaken for fossil plants. The hydrous oxide of manganese is the mineral that generally assumes this form, occurring frequently in great abundance in limestone, steatite, trachyte, and other substances.

DENDROLITES, petrified stems of trees or shrubs, found in all parts of the world in the formations called Secondary, especially in the coal formation. They vary in size, and may be considered the remains of a former creation. In some instances gigantic stems occur, which often contain branches, fruit and even the impressions of leaves; and in other places mere fragments are found, which bear no resemblance to the trees now growing in the same regions, the fossil stems of beautiful palms having been discovered at Chemnitz, in Saxony, and other similar places. Such woods, when preserved in ancient strata altered by volcanic fire, are changed into agate, or into pitchstone. Opinion is divided regarding their origin.

DENGUE, or BREAK-BONE FEVER, also called DANDY and BUCKET FEVER, a disease known in the Southern States of North America and in the West Indies, where it was first described as having ap-

peared in 1827 and 1828. It is seldom fatal, though very violent in its access, mainly consisting of an attack of inflammatory fever, accompanied by pains of the limbs, in the joints and muscles. It usually terminates by a copious perspiration after a few days.

**DENISON**, a rapidly growing city of Grayson county, Texas, situated within three miles of the northern boundary of the State. It is an important railroad, shipping, and trading center, having a large trade with the fine agricultural region in its vicinity. The city is especially noted as a fruit market. It has excellent water works and considerable manufactures. It contains St. Xavier convent, a business college, good schools, ice factory, meat refrigerator, planing mill, iron foundry, etc. It has also railroad machine shops. Population in 1880, 3,975; in 1890, 10,959.

**DENISON**, county-seat of Crawford county, Iowa, situated on the Boyer River. It has thriving manufacturing factories.

**DENISON**, **GEORGE ANTHONY**, an eminent English prelate, brother of John Evelyn Denison, born in 1805; became vicar of East Brent in 1843, and archdeacon of Taunton in 1851. On a charge of teaching the doctrine of the real presence he was condemned by an ecclesiastical court, in 1854, to be deprived of his preferments; but the judgment was quashed by the court of arches and the privy-council. He is a leader of the high church party, an opponent of secular education, and an advocate of the confessional. He was for many years editor of the "Church and State Review;" and was chairman of the committee of convocation which condemned Bishop Colenso's works. His principal literary productions are his delightful *Notes of My Life and Mr. Gladstone*.

**DENISON**, **JOHN EVELYN** (1800-73), for many years speaker of the House of Commons and privy councillor. He was a D. C. L. of Oxford, and was created Viscount Ossington. He retired from the speaker's chair in 1872.

**DENISON**, **MARY ANDREWS**, author, born in Cambridge, Mass., May 26, 1826. Her husband, Charles W. Denison, was a clergyman, author and editor. She has lived in London and British Guiana, and written for American and English magazines. Among her books the most popular have been *That Husband of Mine*, and *That Wife of Mine*.

**DENISON UNIVERSITY**. See **COLLEGES**, in these Revisions and Additions.

**DENMARK** (Kongeriget Danmark). For the early history, climate, productions, commerce, etc., of the kingdom of Denmark, see *Britannica*, Vol. VII, pp. 80-94. According to the last decennial census, taken Feb. 1, 1890, the total area of Denmark was 14,124 square miles, and the total population 2,185,159. The population in 1870 was 1,794,733, and in 1880 1,980,259, showing an increase during each of the two decennial periods of nearly 10 per cent., or 1 per cent. per annum. In Denmark proper the town population has increased from 515,758 in 1880 to 663,121 in 1890, or at the rate of 28.7 per cent.; while the rural population has increased from 1,453,281 in 1880 to 1,509,084 in 1890, or at the rate of 3.77 per cent. The population is almost entirely Scandinavian. Out of every 1,000 persons, 469 live exclusively by agriculture, 229 by manufacturing industries, 68 by trade, and 27 by seafaring and fishing.

The financial budget for 1890-91, sanctioned by provisional law of April 2, 1890, provided for a total revenue of 54,683,727 kroner, and a total expenditure of 63,300,803 kroner. An important feature in the administration of the finances of the kingdom is the maintenance of a reserve fund of a compara-

tively large amount. On March 31, 1889, the fund stood at 17,821,796 kroner. The object of the reserve fund is to place means at the disposal of the government in the event of sudden emergencies. The public debt of Denmark, which was incurred in part by large annual deficits in former years, before the establishment of parliamentary government, and in part by railway undertakings, and the construction of harbors, light-houses, and other works of public importance, amounted at the close of the fiscal year, March 31, 1889, to 190,331,149 kroner. The investments of the State, excluding the reserve fund, amounts to about 82,000,000 kroner, thus reducing the debt to about one-half.

The army consists of all the able-bodied young men of the kingdom who have reached the age of 22 years. They are liable to service for eight years in the regular army and its reserve, and for eight years subsequent in the extra reserve. The total peace strength of the army in 1890 was 294 officers, and 16,318 men; the total war strength, about 60,000 men.

About 80 per cent. of the total area of Denmark is productive. According to latest returns the total area under corn crops was 2,917,680 acres; potatoes, 110,306 acres; clover, 396,418 acres; bare fallow, 638,116 acres; grass, meads, etc., 3,163,020 acres. The leading crops in 1889 were oats, 25,758,591 bushels; barley, 19,323,617 bushels; rye, 16,798,647 bushels; wheat, 4,825,311 bushels; potatoes, 16,913,832 bushels; other roots, 28,825,434 bushels; besides vegetables, hay, and clover. The total value of the produce in 1889 was 274,396,459 kroner. The total imports for the year 1888 amounted to 274,401,000 kroner, and the exports to 192,699,000 kroner. On July 16, 1888, there were in Denmark proper, 375,533 horses; 1,459,527 head of cattle, 1,225,194 sheep, 13,405 goats; and 770,785 swine.

In 1889 there were in Denmark a total length of 1,214 English miles of railway open for traffic, of which about 1,000 miles belonged to the State.

**DENNERY**, or **D'ENNERY**, **ADOLPHE PHILIPPE**, a dramatic writer of Jewish extraction, born at Paris in 1811. He was decorated with the Legion of Honor, Dec. 10, 1849, and promoted to the rank of officer, Aug. 16, 1859. He produced about 200 pieces from 1831 to 1887 and was the creator of Caubourg, a watering-place in Normandy.

**DENNIE**, **JOSEPH**, journalist, born in Boston, Mass., Aug. 30, 1768, died in Philadelphia, Jan. 7, 1812. He graduated at Harvard, and studied law, but made literature his profession. He edited "The Farmer's Museum," the "United States Gazette," and founded and edited "The Portfolio." Collections of his essays, entitled *The Lay Preacher*, or *Short Sermons for Idle Moments*, were published in book-form. Mr. Dennie wrote under the pen-name of "Oliver Old School." He founded the "Tuesday Club," many of whose members were on the staff of *The Portfolio*.

**DENNISON**, **WILLIAM**, born in Cincinnati, Ohio, Nov. 23, 1815, died in Columbus, June 15, 1882. He graduated at Miami College in 1835; adopted the legal profession; was elected to the legislature in 1843; was chosen delegate to the first Republican national convention, and in 1860 was elected on the Republican ticket as governor of Ohio, and from 1864 to 1866 was Postmaster-General. He was president of the Columbus and Xenia railroad.

**DENOUEMENT**, in fiction, a term generally applied to the termination or catastrophe of a play or romance, but, more strictly speaking, designating the train of circumstances solving the plot and hastening the catastrophe. A good denouement in a play or novel should be natural, as the result of the preceding plot, and yet should not be so obvi-



ous as to be easily anticipated. Forced and arbitrary solutions of plot, offending against nature and common sense, are frequently perpetrated for theatrical effect.

DENS, PETER (1690-1775), a Roman Catholic theologian, born near Antwerp, at Boom. He was parish priest of Saint Rumold's, and president of the College of Malines for 40 years. His work, *Theologia Moralis et Dogmatica*, is extensively used as a textbook in the Roman Catholic theological schools.

DENSITY OF THE EARTH. The density of a body is the ratio of its mass when compared with the same bulk of water. Astronomy and the laws of gravitation have furnished the data for ascertaining the density of the earth, which is now assumed to be about five times that of water. See ASTRONOMY, Britannica, Vol. II, pp. 792, 793; and GEOLOGY, Vol. X, pp. 222, 223.

DENTARIA, or coral-root, a genus of plants of the natural order *Cruciferae*, with rose-colored flowers and a knobbed root stalk, from which it derives its name. The root-stalk is pungent, and was formerly dried and used as a remedy for toothache.

DENTATUS, MANIUS, or MARCUS CURIUS, a Roman consul, noted for his integrity as well as for martial exploits. He died B. C. 265.

DENTEX, a genus of acanthopteron fishes of the family *Sparidae* (sea-breams, etc.). It sometimes attains a length of three feet and weighs 30 pounds. One species abounds in the Mediterranean.

DENTIL. See ARCHITECTURE, Britannica, Vol. II, p. 463.

DENTIFRICE, the name given to powders or washes used for cleaning the teeth. The ingredients employed are charcoal, common salt, chalk, phosphate of soda, cream of tartar, myrrh, catechu, and cinchona.

DENTRIOSTRES, a tribe or sub-order of birds, of the order *Inssesores*, characterized by a bill with a marginal notch toward the extremity of the upper mandible. It is composed mainly of insectivorous birds, although the shrikes (*Laniidae*), which belong to it, prey also on small birds, quadrupeds and reptiles.

DENTISTRY, PROGRESS IN. For general article on DENTISTRY, see Britannica, Vol. VII, pp. 95-100. While in the human family the most important function of the teeth is to subserve nutrition by the mastication of food, they also aid very materially in the formation of articulate sounds, many of the tones and pronunciations of words depending, in high degree, upon the presence of teeth. Their impairment is, therefore, a matter of regret, and their replacement a matter of great convenience, if not of necessity. The practice of dentistry has been known for ages, and is attested by the works of the most ancient writers among the Greeks, as well as the discoveries among mummies in Egypt, the latter showing false teeth carved from ivory and fitted with gold plating of most skillful manufacture, dating back to an unknown period in Egyptian history.

Any accident, difficulty or disease attending the teeth, either singly or together, is quickly productive of disorder in the general system. A partial classified list of abnormal complications is given as follows:

*Caries*—Dry decay, or destructive disease of the bone, especially a disease resulting in the disintegration of the substance composing the various parts of the individual teeth, thereby causing cavities.

*Excrementous*—a morbid, bony growth on the surface of the teeth.

*Abrasion*—a wearing or rubbing off, or away, by friction.

*Fracture*, or breakage.

*Dislocation*, or displacement, a derangement of the teeth.

*Dislocation*, or rending asunder the parts; a forcible displacement of the cap of dentine and enamel of a partially developed tooth from the formative pulp.

*Irritation*, or evoking an abnormal action.

*Inflammation*, a morbid condition characterized by swelling, pain, heat, and redness.

*Granulation* (polypus), or the formation of new tissue.

*Suppuration*, or the generation of pus.

*Death*, or the cessation of life in any particular part of the tooth.

*Irritation*, the result of abnormal action.

*Inflammation*, acute and chronic, producing pain, heat, and redness.

*Hæmorrhage*, or unusual discharge of blood.

*Abscess*, or collection of pus, a gum boil.

The number of dental instruments has increased many fold; drills of various sizes, which are operated by pedal mechanism, and into which bit burr and chisel, and electrical mallets for chipping and trimming are among some of the more important inventions. A piece of rubber (the "rubber dam") for protecting the teeth, and operating somewhat after the manner of a coffer dam during the process of cleaning and filling, is one of the most valuable acquisitions for keeping the tooth under operation dry and clean. The corundum wheel, invented by Dr. Robert Arthur in 1878, is regarded as a great advance on any previous methods of cleaning and polishing.

Vulcanite as a substitute for metal, horn, bone, or ivory, in plate work, has become so popular as almost entirely to supersede their use. Its ease of management, and the readiness with which it is molded to the form of the mouth; its susceptibility of being colored to suit the color of the gums, and the firmness with which it retains the imbedded teeth, make it of great value in dentistry. Celluloid also enters largely into dental use in supplanting metal, etc., for the same reasons. Both have been brought to so high a degree of perfection in manufacture as to be placed in position within a few weeks after the decayed stumps of the original teeth have been removed, without inconvenience to the wearer, and with little or no danger of being thrown from their place by sudden coughing.

Porcelain has been for centuries a favorite material for use in the arts. It was used in the Etruscan vases of antiquity, and the existing legends of later ages, and with steadily increasing improvements has come down to our own age. It has been found of the greatest use in manufacturing teeth. In respect of cleanliness, appearance, and naturalness in shape and color, it has no superior in that department of dentistry. The first porcelain teeth manufactured in the United States date from 1830. In 1835 their manufacture was begun on an extended scale. In recent years the rapidly made in molding, enameling, and coloring, until in recent years the life-like appearance of porcelain teeth has seemed to have reached its completion. In 1844 Samuel S. White began their manufacture in Philadelphia on an extended scale, and built up an enterprise which soon became the largest of its kind in the world. In addition to the great factory turning out 400,000 teeth every month, branch houses were established in New York, Brooklyn, Boston and Chicago. It is estimated that this one American house manufactures more than one-half of all the artificial teeth used in the world.

Porcelain has also, in late years, entered into the manufacture of plate work. Its freedom from the deleterious matters, sulphate of zinc, and sulphate of mercury, which enter into the composition of rubber plate, or vulcanite and celluloid (camphor-gum forming one of the component parts of celluloid), as well as the entire absence of mineral taste attendant on metallic plates, make it invaluable in plate work. The porcelain used in this feature of dentistry is composed wholly of feldspar and silica. For cleanliness and purity of surface this plate is thus far unsurpassed, owing principally to its freedom from all chemical action which takes place in the use of metallic plates, and from compounds such as those containing sulphates or sulphides. The teeth are made of porcelain, and afterwards fitted into plates of porcelain in such perfection that no inconvenience is felt by the wearer, and no "falsity" recognized by the most critical observer, except by permission of the wearer. Porcelain teeth and plate are indestructible by oral secretions, and the most delicate color-tones are readily given shades of opacity grading into transparency and texture as determined by the eye, affording a perfect substitute for the lost organ. The use of porcelain in plate work was first practiced by Mahlon Loom, of Washington, D. C., who protected his process by patents, which were subsequently assigned to Dr. William E. Dunn, formerly of Delaware, Ohio, but subsequently a resident and eminent dentist of New York city.

One of the greatest advances in the mechanics of dentistry, is the electric-magnetic mallet, devised by Dr. W. C. A. Bonwill, with improvements by Dr. M. H. Welb. It is a small instrument, held and guided by the hand, for the purpose of hammering and packing by gentle strokes rapidly given on the gold or other filling in the cavity of the tooth. It accomplishes in a few seconds what previously required in many instances an hour's time, while the work accomplished is regarded as perfect.

It is stated that the first dentist in what are now the United States, was John Woodendale, of England, who practiced in New York and Philadelphia from 1766 to 1768, and then returned to England. The next was a Frenchman, Le Mair, who came over with the French army to aid the colonies in the Revolutionary struggle. A Mr. John Whitlock followed in 1784. Isaac Greenwood was the first dentist to settle in Boston, and his son, John Greenwood, is claimed to

have been the first native-born American dentist, beginning practice in New York city in 1788, and as late as 1790 was the only dentist in the city. In that year he constructed an entire denture for General Washington, and in 1795 another which was unsurpassed by any European work. The teeth were carved from ivory and held in place by spiral springs. As an evidence of the remarkable growth of dentistry in the United States the following comparative table is given, taken from official sources, and showing the number of dentists in the United States, by decades:

|                        |        |
|------------------------|--------|
| 1820 .....             | 100    |
| 1830 .....             | 300    |
| 1840 .....             | 1,200  |
| 1850 .....             | 2,923  |
| 1860 .....             | 5,000  |
| 1870 .....             | 7,839  |
| 1880 .....             | 12,314 |
| 1890 (estimated) ..... | 16,000 |

It is estimated that the total in other countries does not exceed 5,000. The relative progress, therefore, of dentistry has been very great in the States. During the last ten years there has also been a great improvement in methods. Among the more important is that of "capping," to preserve the vitality of the pulp of the tooth. The preparations used are many. Lead, tin, asbestos, a pulverized preparation of gutta-percha and feldspar, clarified quill, and later a compound made of oxide of zinc and dilute deliquescent chloride of zinc have all been used. This latter is regarded with especial favor. In its use, and for the purpose of avoiding possible pain by coming in contact with the tender pulp, a thin paste of oxide of zinc and carbolic acid is first laid on, and on this is built the superstructure made of the oxychloride of zinc.

Great progress has been made in the dental profession in respect of the organization of colleges, the formation of societies and the publication of journals. Of colleges there were at the close of the year 1890, in Cincinnati, the "Ohio College of Dental Surgery," in Philadelphia, the "Pennsylvania College of Dental Surgery," and the "Philadelphia Dental College," in New York city, the "New York College of Dentistry," in St. Louis, the "Missouri Dental College," in New Orleans, the "New Orleans Dental College," in Boston, the "Boston Dental College," and the "Dental School of Harvard University."

Many new processes have also been, and are still being developed for the implantation of teeth; investigations are being prosecuted in the bacteriological causes of decay; the treatment and cure of Pyorrhea Alveolaris; filling the teeth with porcelain; new methods in regulating teeth; treatment of fractured jaws; and treatment of cleft palate. The science of dentistry is advancing much more rapidly in the United States than in any other part of the world.

**DENTON**, the county-seat of Caroline county, Md., situated on the Choptank River, 53 miles southeast of Baltimore.

**DENTON**, the county-seat of Denton county, Texas, on a tributary of Trinity River and the Dallas and Wichita railroad. The village has manufactories of flour and pottery.

**DENVER**, a city of Colorado, the capital and commercial metropolis of the State, and county-seat of Arapahoe county (see Britannica, Vol. VII, p. 100). Denver is situated on the south bank of the South Platte River, at an elevation of 5,196 feet, in latitude 39° 45' N., longitude 104° 59' 23" W. It is but a few miles from the base of the foot-hills, which rise and gradually recede into the mountains, thus affording a beautiful view of many mountain-peaks covered with perpetual snow. Pike's Peak and Long's Peak are both visible in the distance. The city is beautifully laid out, has wide streets lined with elegant residences and substantial business houses; has a well-ordered city government, water works, gas works, electric lighting establishments, fire department, telephone exchange, street railways, and all the conveniences of a modern and progressive metropolis. Its public buildings are among the finest in the West, and its public school system is of special excellence. It has numerous fine churches, one of them, the Trinity Methodist Episcopal, completed in 1888, being one of the most magnificently appointed in America, and representing in actual valuation more than one-quarter of a million of dollars. Denver is the emporium of the rich gold and silver mining districts of Colorado, and has a branch of the United States mint. Although first settled in

1858, and having but a moderate growth for the first fifteen years of its existence, its population in 1880 was 35,629; while in 1890 it had reached the remarkable total of 126,186.

**DEODORIZERS**, chemical substances employed for the purpose of absorbing or destroying the odoriferous principles evolved especially from decomposing animal and vegetable matter. They strictly belong to the class of substances known as antiseptics and disinfectants. See Britannica, Vol. VII, p. 258.

**DEOXIDATION**, a term applied to the process of withdrawing the oxygen from a compound, as in the reduction of the native peroxide of iron in the smelting furnaces to the condition of metallic iron. On the small scale, in experimental inquiries, the process of *deoxidation* may be carried on before the blow-pipe, where the inner or reducing flame is essentially a deoxidizing one.

**DEPARTMENTS, UNITED STATES**. The administration of the various branches of the United States Government is carried on by means of departments. Thus the State Department having at its head the Secretary of State, attends to diplomatic and international correspondence, etc.; the War Department, at the head of which is the Secretary of War, has control of all matters pertaining to the military affairs of the country; the Navy Department, having the Secretary of the Navy at its head, attends to those of the navy; the Interior Department, having the Secretary of the Interior at its head, controls all matters pertaining to government lands, their settlement, etc.; the Treasury Department, perhaps the most important of all, with the Secretary of the Treasury at its head, attends to all financial matters of the Government, coinage and collection of revenue; the Department of Agriculture acquires and diffuses among the people information on subjects connected with agriculture; the Post Office Department conducts the postal service. The heads of these departments constitute the President's Cabinet.

**DE PAUW**, WASHINGTON CHARLES, born in Salem, Ind., Jan. 4, 1822, died in Chicago, Ill., May 5, 1887. He was a grandson of a Frenchman who accompanied Lafayette to America, to take part in the War for Independence. Mr. De Pauw engaged in legal work, milling, the grain business, and in the manufacture of plate glass. He endowed De Pauw University at Greencastle, Ind., and gave \$1,500,000 to De Pauw Female College at Albany, Ind.

**DE PAUW UNIVERSITY**. See COLLEGES, in these Revisions and Additions.

**DE PERE**, a manufacturing city of Brown county, Wis., on the Fox River. Water power is obtained by means of a dam across the river, and the city has manufactories of wagons, shingles, and wooden-ware, and contains car-shops, iron-works, and a flour-mill. The city has connection with Chicago and Buffalo by means of a line of steamers.

**DEPEW**, CHAUNCEY MITCHELL, orator and railroad president, born in Peekskill, N. Y., April 23, 1834. He graduated from Yale in 1856, was admitted to the practice of law in 1858. His public career as an orator was begun in 1856, when he took the stump for Fremont. In 1861 he was sent to the legislature; in 1863 elected secretary of N. Y. State, declining reelection two years later. In 1866 he was chosen attorney for the New York and Harlem Railroad, and three years later, when the railroad was consolidated with the N. Y. Central, he became general counsel of the company. He was elected second vice-president of the Central Railroad in 1882, and the following year, president of the "Vanderbilt" roads. Mr. Depew is president of



the Union League Club and the Yale Alumni Association of New York city. A volume containing a number of his addresses has been published, including those made on the unveiling of the statues of Alexander Hamilton, and of Bartholdi's *Liberty*; on the life and character of Garfield; and on the 32d anniversary of the Young Men's Christian Association.

DE PEYSTER, JOHN WATTS, born in New York city, March 9, 1821. He is a descendant of a French Huguenot family, whose first representative in New York, Johannes De Peyster, emigrated from Holland about 1685; became a merchant in New York city, and held several important public offices. Mr. De Peyster became in 1845 colonel of the 111th regiment of New York militia and in 1866 was brevetted major-general. He has written on military, historical, and ethnological subjects. Among his numerous publications are *Life of Field Marshal Torstenson*; *The Dutch at the North Pole*; *Carausius, the Dutch Augustus*; and *Personal and Military History of Gen. Philip Kearney*.

DEPILATORIES, or EPILATORIES, chemical agents employed for removing superfluous hair from the skin. They were extensively used by the ancients.

DEPONENT, a term in Latin grammar applied to verbs of a passive form, but active in signification. They are so called because they, as it were, lay down or dispense with the signification proper to their form, and originally, they all had a reflective meaning, like the middle voice in Greek verbs; thus *aversor*, "I detest," means radically, "I turn myself away from."

DEPOSIT, a village of New York on the Delaware River, and on the Erie Railroad. It is situated partly in Broome county and partly in Delaware county. It has flour and planing mills, and stock yards.

DEPOSITION, the testimony of a witness set down in writing, and taken by a judge or by a commissioner specially appointed by him for that purpose. The depositions are answers to questions generally put by the legal representatives of the parties to the suit under the control of the court or commissioner, and the answers are taken down by the clerk of court, or by a clerk specially appointed for the purpose. The deposition cannot be read where the witness himself might be produced, secondary evidence being never admissible.

DEPPING, GEORGE BERNARD (1784-1853), a French geographer and historian. In 1803 he began teaching German and writing for the press. He published many books, nearly all of which are of a historical or geographical character.

DEPRESSION, or DEP OF THE HORIZON, the angle through which the sea horizon appears depressed in consequence of the elevation of the spectator.

DE PROFUNDIS ("Out of the depths"), the first words of the 130th Psalm, which form a portion of the liturgy of the Roman Catholic church, and is sung when the bodies of the dead are committed to the grave. A tender melancholy pervades the psalm, which, however, brightens up at the close under the conviction that there is a "plenteous redemption."

DEPUTY, one who exercises power which properly belongs to another who has placed him in his stead. The appointment of the deputy does not free the principal from responsibility, for the deputy is not an assignee.

DE PUY, HENRY WALTER, born at Pompey Hill, Onondago county, N. Y., in 1820, died Feb. 2, 1876. He was a lawyer, the private secretary of Gov. Horatio Seymour (1853-54), served on foreign mis-

sions (1854-60), was secretary of Nebraska, and appointed Indian commissioner by President Lincoln. He was an editor, a newspaper writer, and the author of *Kossuth and His Generals*; *Louis Napoleon and His Times*, and other works.

DERAH, an Egyptian unit of measure, of interest as connected with recent conjectures concerning the pyramids. This measure is sub-divided into *kadam*,  $\frac{1}{2}$ ; *abdat*,  $\frac{1}{3}$ ; and *kerat*,  $\frac{1}{4}$  of a *derah*.

DERBY, a manufacturing village and railroad junction of New Haven, Conn., at the confluence of the Housatonic and Naugatuck Rivers.

DERBY, EDWARD HENRY SMITH STANLEY, 15th Earl of, an English statesman, born in 1826. In 1848 he became a member of Parliament for the borough of Lynn-Regis, and in 1852 was appointed under-secretary for foreign affairs. In 1858 he became secretary for India, and in 1869 succeeded his father, the 14th Earl of Derby, in the earldom. In 1874 he again became foreign secretary under Disraeli, but resigned in 1878 and joined the Liberal party two years later. From 1882 to 1885 he was secretary for the colonies.

DERBY, ELIAS HASKET, merchant, born in Salem, Mass., Aug. 16, 1799, died there Sept. 8, 1799. His father was a ship-owner, and the son continued in the business and greatly extended it. He sent trading vessels to Russia, the East Indies, and China. He contributed \$10,000 toward the establishment of the American navy (1798), and loaned supplies and ships to the National Government.

DERBY, ELIAS HASKET (second), merchant and ship-owner, born in Salem, Jan. 10, 1766, died in Londonderry, N. H., Sept. 16, 1826. He was the first importer of merino sheep into this country, and the first manufacturer of broadcloth in Massachusetts.

DERBY, ELIAS HASKET (third), lawyer, born in Salem, Mass., Sept. 24, 1803, died in Boston, Mass., March 30, 1880; he was engaged in the construction of railroads, assisted in the completion of the Hoosac tunnel, and in the building of iron-clads during the civil war. He was a contributor to the "Edinburgh Review" and the "Atlantic Monthly."

DERBY, GEORGE, born in Salem, Mass., Feb. 13, 1819, died in Boston, Mass., June 20, 1874. He was an army surgeon, and gained a high reputation as a sanitarian. He served for four years in the army, attaining the rank of lieutenant-colonel of volunteers. In 1872 he was appointed professor of hygiene at the Harvard Medical College.

DERBY, GEORGE H. (1823-61), an American officer and humorist. He served in the Mexican war, 1846-47, and received the brevet of first-lieutenant. From 1847 to 1860 he was on various surveys and explorations. He is the author of many humorous effusions.

DERBY, JOHN BARTON, born in Salem, Mass., Nov. 13, 1792, died in Boston in 1867. He was a graduate of Bowdoin, a lawyer, and a minor poet.

DERELICT, a term in law, signifying anything forsaken or left unoccupied, or willfully cast away. Where the sea has receded from the shore, the land thus left uncovered is styled derelict. The most common use of the term is its application to a ship which has been wrecked, and has been abandoned by the master and crew without hope of recovery. The mere quitting of a ship for the purpose of procuring assistance from the shore, or other temporary cause, with the intention of returning to her again, does not make her derelict.

DERIVATION, in medicine, a method of curing disease, by which it was formerly supposed that the *materies morbi*, or matter of the disease, was drained away through some channel established

for it by artificial means, as when a blister is applied over an inflamed lung.

**DERMESTES**, a genus of coleopterous insects of the section *Pentamera* and of the family *Clavicornes*, having antennæ shorter than the thorax, their three terminal joints forming an ovate compressed club. Their larvæ feed mostly on dry and decaying animal matter and are very voracious, committing great ravages among furs, collections of natural history, etc. *D. lardarius* is the familiar bacon beetle, the larvæ of which is so often destructive to bacon and other dried meats, and often to cheese. See *Britannica* Vol. VI, p. 126.

**DERRICK**, a mechanical contrivance used for the same purpose as the crane, but recently so improved in size, strength, and mechanism as to be able not only to raise a body of 1,000 tons in weight, but also to transport it from one place to another.

**DERWENTWATER**, JAMES RADCLIFFE, EARL OF, born in 1688, grandson of Charles II of England, was one of the leaders in the rebellion of 1715. He was taken prisoner at Preston, and conveyed to the Tower of London; at his trial in Westminster Hall he pleaded guilty and threw himself upon the mercy of the king, but his appeal was rejected and he was beheaded on Tower Hill, Feb. 24, 1716. He was the last earl of Derwentwater.

**DERZAVIN**, GABRIEL ROMANOWICZ (1743-1816), a popular Russian lyric poet, whose most celebrated poem is the *Address to the Deity*. See *Britannica*, Vol. XXI, p. 106.

**DESERTION**, the abandonment of a duty willfully and without right. See *Britannica*, Vol. VII, p. 301, (Divorce); Vol. XVI, p. 298 (Military Law); Vol. XXIV, p. 643.

**DESICCATION**, the process of drying by heat, dry air or chemical agents which have an affinity for water. Examples of the class of drying substances or desiccants are fused chloride of calcium, quicklime, fused carbonate of potash and oil of vitriol. The latter is employed by being placed in a separate vessel near the substance to be dried, and under a bell-jar.

**DESIGN**, **SCHOOLS OF**, the original designation of what are now officially termed "Schools of Art." The establishment of schools of design had for its object the training of designers and artisans in the principles and practice of the fine arts. There are many such schools in the United States, and some of them are of rare excellence.

**DESIGNS**, **COPYRIGHT IN**. Designs for articles, whether of ornament or utility, are protected by various statutes.

**DE SMET**, PETER JOHN, missionary, born in Termonde, Belgium, Dec. 31, 1801, died in St. Louis, Mo., in May, 1872. He was a student who emigrated to America in 1821, to work among the Indians. He became a Jesuit and labored among the Pottawattamies, the Flatheads, and in 1845 he visited the Sinpools, Flatbows, the Wandering Creeks, Assiniboins and other tribes. He erected many mission buildings, several times crossed the Atlantic, obtaining money and fellow-workers, exerted a great influence for good over the Indians, and on several occasions prevented hostilities between Indian tribes and between the U. S. government and the Indians. He wrote *The Oregon Missions and Travels Over the Rocky Mountains*; *Indian Letters and Sketches*; *Western Missions and Missionaries*, and *New Indian Sketches*.

**DES MOINES**, a city of Iowa, capital of the State, and county-seat of Polk county (see *Britannica*, Vol. VII, p. 130). Having four trunk lines of railway, besides other shorter lines, its traffic facilities are unsurpassed by any other city in the

State. For local transportation there are fifty miles of electric railway trackage, and eight miles of motor railway trackage. Among the principal public buildings are the United States Federal Court and Post Office building, a marble edifice costing \$385,000, and the State Capitol, an imposing and commodious structure, costing nearly \$3,000,000. The Young Men's Christian Association have erected a building at a cost of \$75,000. The State Agricultural Society has purchased 260 acres of land within the city limits for a permanent location of the Iowa State Fair, upon which it has expended for the improvement of the ground and the erection of permanent exhibition buildings \$135,000. There are forty public schools, and numerous private schools of high order. The Catholics and Hebrews have each parochial schools, and the Des Moines College (Baptist), the Drake University, Callanan College, and the Highland Park Industrial College are located here; also two excellent business colleges. The State library contains 40,000 volumes, and the public library 10,000 volumes. The city is the center of one of the most productive coal areas of the State, there being twenty-nine mines within or near the city limits, from which the output in 1889 was 659 tons. The principal industrial enterprises are mining, pork-packing, and the manufacture of glucose and alcohol. The city enjoys an extensive wholesale trade. Population in 1880, 22,408; in 1890, 50,067.

**DESMONCUS**, an American genus of climbing palms, like the rattans of the East Indies. They have alternate pinnate leaves, with long hooked spines.

**DESPOTISM**, a form of government which has for its object the interests of an individual or of a class, to the exclusion of those of the whole community.

**DESSALINES**, JEAN JACQUES, Haytian emperor, born in Guinea, Africa, in 1758, died in Hayti, Oct. 17, 1806. He was a slave of a French planter, whose name he afterwards assumed. He fought in the revolutionary wars of Hayti, becoming adjutant-general under the negro commander Jean François, and afterwards joining Toussaint L'Ouverture, when the latter united with the French. He became lieutenant-general, fought the mulatto chief Rigaud, winning a name for energy, dissoluteness and brutality. When peace was declared he was appointed governor of the south part of Hayti. His administration was marked by cruelty to the negroes, the cold-blooded murder of Toussaint's nephew, friendliness with the French forces, which was afterwards followed by a war of extermination upon them. When the French had been expelled from the island (1804), Dessalines was made governor-general for life. At first he ruled wisely, but he soon evinced his disposition by ordering a massacre of all the white inhabitants. He had himself crowned emperor of Hayti, taking the title of Jean Jacques I. He became more despotic than ever, concentrating all power within his own hands, and killing every person of whom he was suspicious. An insurrection arose in 1806, and he was killed by his officers.

**DETACHMENT**, in military matters, a small but indefinite number of troops sent away from the regiment, brigade, division, or army, as the case may be, on some special duties. A detachment of one or more ships of a fleet may be told off in a similar manner.

**DETERMINISM**, a term now generally used to denote the doctrine that man's actions are uniformly determined by motives, acting upon his character, and is in direct opposition to the doctrine of the freedom of the will.



**DETMOLD, CHRISTIAN EDWARD**, engineer, born in Hanover, Germany, Feb. 2, 1810, died in New York city, July 2, 1887. He made drawings for the first locomotive built by the Messrs. Kemble in New York, superintended the building of Fort Sumter's foundations, made improvements in the manufacture of iron, built the New York "Crystal Palace," engaged in coal mining, and translated into English some of Machiavelli's political writings.

**DETMOLD, WILLIAM, M. D.**, born in Hanover in 1808, settled in New York in 1837. He introduced orthopedic surgery into the United States; he also gave his voluntary aid as army surgeon during the civil war, and invented an improved knife for the use of one-armed men.

**DE TROBRIAND, PHILIPPE REGIS**, soldier, born near Tours, France, June 4, 1816. He was educated in his native country, and came to America in 1841, where he was successively connected with two French newspapers. When the civil war broke out he enlisted on the Northern side and fought at Yorktown, Williamsburg, Fredericksburg, Chancellorsville, Gettysburg, Petersburg, and several other important battles. He was brevetted brigadier-general, in 1867 assigned to the district of Dakota, and later to those of Montana and Green River. He was retired from service at his own request, being sixty-three years of age when he left the service.

**DETROIT**, a city of Michigan, the commercial metropolis of the State, and county-seat of Wayne county (see *Britannica*, Vol. VII, pp. 133-34). The transportation facilities for the commerce and manufactures of Detroit are unsurpassed by those of any city in America. The lake traffic that passes up and down the Detroit River is enormous, and it is estimated that a vessel of some kind passes the city every seven and one-half minutes during the season. Detroit possesses manufacturing establishments of national importance. Among them are three manufactories of cars, three stove-works, and two medicine factories. One of the largest seed-houses in the world has its headquarters here. There are also large establishments for smelting iron and copper, and for the manufacture of engines, bridges, machinery, tools, furniture, boots and shoes, tobacco, etc. The public school system of Detroit is in a high state of development. The churches are numerous, and of unusual architectural beauty, among the most notable being the Woodward Avenue Baptist church. The Museum of Art and the City-hall are also notable specimens of architectural excellence. An international fair and exposition was held in Detroit in 1889, which attracted wide spread attention. The buildings covered over 14 acres of ground, the main building being the largest of its kind in the world. It has a frontage of nearly five hundred feet, with an area for exhibition purposes of about 200,000 square feet. The population of Detroit in 1880 was 116,340; in 1890, 205,669.

**DETROIT CITY**, the county-seat of Becker county, Minn., on the Northern Pacific railroad and Detroit Lake, 206 miles west of Duluth.

**DETTINGEN**, a village of Bavaria, on the Main, 10 miles northwest of Aschaffenburg by rail, noted as the scene of a battle during the war of the Austrian Succession. Here on June 27, 1743, George II of England, commanding English, Hanoverians and Austrians, defeated the larger French army under the Duc de Noailles. This was the last occasion on which a king of England took the field in person.

**DEUS EX MACHINA**, an expression borrowed from the classical theater. The tragic poets of

Greece, instead of using natural means to bring about the denouement of their plots, often resorted to a more expeditious mode—the intervention of a god, who descended in a machine, and abruptly solved the difficulty that hindered its proper termination. In modern tragedy the arbitrary introduction of a person or incident into the conduct of a plot simply to remedy some inartistic negligence in its construction, is metaphorically called a *Deus ex Machina*.

**DEUTZIA**, a genus of shrubs of the order *Philadelphaceæ*, found in China, Japan, and Northern India, and much cultivated. It has pretty white flowers, and is named for Jan Deutz, of Holland.

**DEVASTAVIT**, in law, a term applied to the waste or mismanagement of the assets of a deceased person by an executor or administrator. See *Britannica*, Vol. XXIV, p. 394.

**DEVELOPMENT**, in photography, is the process which immediately follows exposure, and which renders the picture visible in all its details. It consists in the precipitation of *new material* on that portion of the sensitive surface which has been acted on by light; the same principal, therefore, prevails in all processes. See *PHOTOGRAPHY*, *Britannica*, Vol. XIX.

**DEVENS, CHARLES**, jurist, born in Charlestown, Mass., April 4, 1820, died Jan. 7, 1891. He was a graduate of Harvard, and studied law at Cambridge. He was United States marshal for the district of Massachusetts when the fugitive slave Thomas Sims was demanded by his master. The marshal, notwithstanding public sentiment, delivered the slave to his owner, and afterwards tried to purchase his freedom, but failed. When the Union army advanced into the South Sims was liberated, and assisted pecuniarily by Mr. Devens. The latter fought in the civil war; was wounded at Ball's Bluff, Fair Oaks and Chancellorsville, and at the end of the war was brevetted major-general for gallant conduct at Richmond. He resumed legal duties in 1866, was appointed justice of the Supreme Court of the State in 1873, and was attorney-general under President Hayes.

**DE VERE, SIR AUBREY** (1788-1846), an Irish poet. He wrote little until thirty years of age, when he published two dramatic poems, and subsequently produced many popular works.

**DE VERE, AUBREY THOMAS**, an Irish poet, born in 1814. He began to write poetry at an early age, his productions attaining considerable popularity. In 1854 he became honorary professor of political and social science in the Roman Catholic University of Dublin.

**DE VERE, MAXIMILIAN SCHELE**, an American philologist, born in Sweden in 1820. He came to the United States in 1842, and in 1844 was made a professor in the University of Virginia. He has published many important works on philology and other subjects.

**DEVICE** (from the Middle Age Lat. *divisa*, a drawing or design), a motto expressed by means of a pictorial emblem. The motto proper originated in the emblem, a written inscription coming to be added to the pictorial design, with the view of rendering the meaning more explicit. Devices thus consist of two parts: a figure called the "body," and a motto in words called the "soul" of the device. As early as the times of Æschylus the "Seven Heroes Before Thebes" are all represented with devices on their shields; and Xenophon relates the same of the Lacedæmonians and Sicyonians. In the Middle Ages devices on coat-armor came into regular and formal use, and chivalry employed them in its courtly expressions of devo-

tion to the fair sex. They were used as charges on the shield and as crests.

DEVIL, or SATAN (Gr. *diabolos*, "false accuser." Heb. *satán*, "adversary"), in the Old and New Testament, a mighty spirit of evil, who has, during unknown ages, ruled over a kingdom of wicked spirits, and is in constant opposition to God. The conception of Satan was very gradually developed in the Jewish mind, and it is beyond all question that it acquired clearness and prominence through extra-national influences.

DEVIL'S LAKE, the name of a body of water and of a small village in the north-eastern part of North Dakota. The village is on a railroad, and is the county-seat of Ramsey county.

DE VINNE, DANIEL, Methodist Episcopal clergyman, born in Londonderry, Ireland, Feb. 1, 1793, died in Morrisania, N. Y., Feb. 10, 1883. He was brought up in New York State, became a minister in the Methodist Episcopal church, and after filling appointments in Louisiana and Mississippi for five years he was transferred to the New York conference on account of his anti-slavery opinions. He was a contributor to the religious press, and published the following books: *The M. E. Church and Slavery; Recollections of Fifty Years in the Ministry; and the Irish Primitive Church.*

DE VINNE, THEODORE Low, a printer, born in Stamford, Conn., Dec. 25, 1828. He took up his residence in New York city in 1849, and ten years later became partner of his employer, Francis Hart, whom he succeeded in business. Since the beginning of the *St. Nicholas* in 1873, Mr. De Vinne has been its printer, and the printer of the *Century* since 1874. He has done much for the improvement of typography, and the excellence of his press-work and wood-cuts has given him a reputation. He is a member of the Typothetae, the Author's club, the Grolier club; is a contributor to current literature, and has published *Printer's Price List; Invention of Printing; and Historic Types.*

DEWEES, WILLIAM POTTS, physician, born in Pottsgrove, Pa., May 5, 1768, died in Philadelphia, May 18, 1841. He studied medicine at the University of Pennsylvania, and began to practice at Abington. The yellow fever depleted the ranks of Philadelphia physicians in 1793, and Dr. Dewees removed to that city. He won distinction in the department of obstetrics, and in 1826 was appointed to a professorship of obstetrics and diseases of women and children in his *alma mater*. He has written medical books on these two specialties and on the *Practice of Medicine.*

DEWEY, CHESTER, author and educator, born in Sheffield, Mass., Oct. 25, 1784, died in Rochester, N. Y., Dec. 5, 1867. He graduated at Williams College, and entered the ministry. He was influenced to abandon this profession by the offer of a tutorship in Williams in 1808. Two years later he was offered the chair of mathematics and natural philosophy, which position he held for seventeen years. In 1836 he was called to the presidency of the Collegiate Institute in Rochester, N. Y., where he remained fourteen years, and was then appointed to the professorship of chemistry and natural philosophy in the University of Rochester. He was a botanist, and an authority on the subject of grasses. One of his works, the *History of the Herbaceous Plants of Massachusetts*, was published at State expense.

DEWEY, ORVILLE, theologian, born in Sheffield, Mass., March 28, 1794, died there March 29, 1882. He graduated at Williams College in 1814, and from the Andover Theological Seminary in 1819. He became a Unitarian, and for two years was the

assistant of Dr. Channing. He was successively pastor at New Bedford, in New York city, in Albany, in Washington, and in 1858 he was settled at Boston, where the society was called the "New South." Here he remained four years, and then retired to his farm, where his last years were spent. He visited Europe twice on account of his health; delivered two courses of lectures, entitled *The Problem of Human Life and Destiny*, and *Education of the Human Race*, and wrote controversial sermons and addresses.

DE WITT, a railroad junction and manufacturing town of Clinton county, Iowa, situated 25 miles north of Davenport.

DEXTER, an important business center of Penobscot county, Me. It manufactures machinery and woolen goods.

DEXTER, a manufacturing village of Washtenaw county, Mich., on the Huron River, 47 miles west of Detroit. It has flour, woolen, and planing mills, and car-works.

DEXTER, HENRY, sculptor, born in Nelson, Madison county, N. Y., Oct. 11, 1806, died in Cambridge, Mass., June 23, 1876. In early life he worked on a farm, and then took up the blacksmithing trade, which he followed until after he was married. He determined to become an artist and took up portrait painting, but in 1840 turned his attention to sculpture. He became particularly successful in making portrait busts; his first was that of Mayor Samuel Eliot, of Boston. He modeled in 1860, thirty-one busts of the governors in the United States then holding office; this included all the governors save those of Oregon and California. Agassiz, Charles Dickens, Longfellow, and other famous men were among those whose portrait busts were made by him. He executed pieces of statuary. *The Backwoodsman; The Cushing Children; Gen. Joseph Warren at Bunker Hill; and Nymph of the Ocean* are some of his works.

DEXTER, HENRY MARTIN, clergyman, born in Plympton, Mass., Aug. 13, 1821, died in 1890. He graduated at Yale and at the Andover theological seminary, and became in 1844 the pastor of a Congregational church at Manchester, N. H. Five years later he was given the care of Berkely St. church in Boston. He became connected with the "Congregationalist" in 1851, and for fifteen years edited the paper. For seven years he edited the "Congregational Quarterly" and in 1867 he resigned his pastorate, being called to the office of editor-in-chief of the consolidated "Congregationalist and Recorder." For three years (1877-80) he was lecturer on Congregationalism at the theological seminary, where he graduated. Dr. Dexter wrote a work on *Congregationalism*, and also *The Voice of the Bible the Verdict of Reason; The Congregationalism of the Last 300 Years*; besides works on future probation, on woman suffrage, and on historical matters connected with the early Puritan church in New England.

DEXTER, SAMUEL, jurist, born in Boston, Mass., May 14, 1761, died in Athens, N. Y., May 3, 1816. He graduated at Harvard, studied law, practiced in Worcester and Middlesex counties, and was elected to the Massachusetts legislature and to both houses of Congress. He resigned from the Senate in 1800, having been appointed Secretary of War by President Adams, and resumed his legal practice at the conclusion of his public services in the cabinet. He was an earnest advocate of temperance, becoming first president of the first temperance society in his State.

DEXTER, TIMOTHY, merchant, born in Malden, Mass., Jan. 22, 1743, died at Newburyport, Oct. 26, 1806. He was an eccentric character, who rose by



singular and fortunate investments from poverty to wealth. He was ignorant and vain, and many curious stories are told of him. He was known as "Lord Timothy Dexter," a title he had bestowed on himself.

DEXTER, a celebrated race horse, a brown gelding, sired by Rysdyk's Hambletonian, the grandfather of Maud S., and foaled in 1858. On reaching maturity he was put upon the track and gained the record of a mile in 2 minutes and 17½ seconds. In 1867 Mr. Robert Bonner purchased him for \$35,000, and under his direction and training the horse made the remarkable record of a mile in 2:16. His height was 15 hands and 1½ inches, and he was possessed of great nerve and energy. He was kept in active use until his 28th year, after which he only indulged in walking exercise. The great racer died of old age, and was carefully buried on his owner's estate.

DHALAC, an island thirty miles in length, with an average breadth of 15 miles, situated off the Abyssinian coast in the Red Sea. The Dhalac Archipelago is the name given to the cluster of islands lying around Dhalac.

DHAWALAGHRI, once supposed to be the highest peak of the Himalaya Mountains, but now ascertained to be at most only the third in point of altitude. Its estimated height is 28,000 feet. It is within the limits of Nepaul.

DHOLE (*Canis dhola*), an Indian species of dog roaming wild through the Western Ghats and in other mountainous districts. It is a very courageous animal of a light-bay color, and has fierce, keen eyes, a sharp muzzle, wide, pointed ears, long legs, and a straight though not bushy tail, its size being midway between that of the wolf and of the jackal. Several similar species or varieties, for which Colonel Hamilton has proposed the sub-generic name *Chryseus*, found in Nepaul, Ceylon, and other Eastern countries, are also called dhole, being sometimes designated by the common name *Red Dogs*. See *Britannica*, Vol. XII, p. 741.

DHUBBOREE, a decayed town in Guzerat, which presents many memorials of ancient grandeur.

DHUNCHEE, or DHANCHI, a plant of the natural order *Leguminosae*, sub-order *Papilionaceae*, having an elongated many-seeded pod, alternately swollen and contracted, as if it contained a string of beads. The *Dhunchee* is an annual herbaceous plant, much cultivated in Bengal.

DIACHYLON, the common healing or adhesive plaster, made by combining litharge, or the red-oxide of lead, with olive oil.

DIACOUSTICS, the science of refracted sounds, or the consideration of the properties of sound refracted by passing through media of different density; sounds passing through or across an object.

DIAGNOSIS (Gr., *dia*, through, and *gnosis*, knowledge), the through-knowledge or thorough knowledge of a disease, embracing its points of distinction from other diseases, its symptoms, their relation to one another, and to the state of the different organs and functions of the body, in so far as this can be appreciated during life. Diagnosis is usually spoken of in contrast with prognosis, which implies the judgment framed by the physician as to the issues of the disease; and also with prophylaxis, which refers to the warding off of disease when supposed to be impending.

DIAGOMETER, an electric instrument, the invention of M. Rousseau, for determining the conducting power of fixed oils, and for detecting adulteration of olive oil.

DIAGONAL, in plane geometry, is a straight line joining any two angles, not adjacent, of a recti-

lineal figure. A line drawn between two adjacent angles would coincide with the boundary-line. A triangle has no diagonal, because any two of its angles are adjacent; a four-sided figure has two diagonals; a five-sided, five; a six-sided, nine, etc. The number of possible diagonals in any figure is found by taking three from the number of sides, multiplying the remainder by the number of sides, and taking half of the product.

DIAGONAL SCALE, a system of lines by means of which hundredths of units may be laid down or measured with compasses.

DIALECT. See *PHILOLOGY*, *Britannica*, Vol. XVIII, pp. 776-77.

DIALOGUE, a conversation between two or more persons, implying, however, greater unity of subject and more formality than an ordinary conversation. The ancient Greek philosophers were fond of this way of conducting their investigations and conveying their instructions (see *LUCIAN*, *Britannica*, Vol. XV, p. 42). The Socratic dialogue is a conversation in the form of question and answer, so contrived that the person questioned is led himself to originate those ideas that the questioner wishes to bring before him. The dialogues of Plato are, as it were, philosophical dramas, in which the Socratic method of investigation is brought to bear upon speculative subjects. The form of dialogue is poorly adapted to the modern state of science. Landor's *Imaginary Conversations* are a happy effort of this kind. The drama is dialogue combined with action.

DIAMAGNETISM. The fact that iron is attracted by the magnet has been known from a very early date; that bismuth exhibits a repulsive action toward the magnetic needle has been known for nearly a hundred years. Dr. Faraday was the first (1845) to show that all bodies are more or less affected by magnetic influence, and his beautiful researches on the subject have opened up a new field in the domain of science. He found that the magnetism of bodies was manifested in two ways—either in being attracted by the magnet, as iron, or in being repelled, like bismuth. For a list giving the kind of magnetism displayed by the more common substances, see *Britannica*, Vol. XV, p. 263.

DIAMOND-CUTTING INDUSTRIES IN UNITED STATES. For general article on the Diamond industry, and optical properties of diamonds, see *Britannica*, Vol. VII, 162-67. Only a very limited number of diamonds have been found in the United States. They are met with in well-defined districts of North Carolina, Georgia, Wisconsin, and California, and all the discoveries thus far have been accidental.

The returns of the census in 1890 showed that there were in New York sixteen firms engaged in cutting and recutting diamonds, and in Massachusetts three. Cutting had also been carried on at times in Pennsylvania and Illinois, but had been discontinued. In 1889 seven of the New York firms ran on full time, but the others were unemployed, respectively 14, 50, 61, 120, 125, and 240 days, owing to inability to obtain rough material at a price at which it could be advantageously cut. The firms that were fully employed were generally the larger ones, whose business consisted chiefly in repairing chipped or imperfectly cut stones or in recutting stones previously cut abroad, which, owing to the superior workmanship in command here, could be recut at a profit, or in recutting very valuable diamonds when it was desired, with the certainty that the work could be done under their own supervision, thus guarding against any possible loss by exchange for inferior stones. The persons employed numbered 236 receiving a total of wages, \$148,114, averaging about \$5.55 severally per day when at work. Of the 19 establishments, 15 are steam-power, and only one used foot-power.

The importation of rough and uncut diamonds in 1880 amounted to \$129,207. In 1889 to \$250,187, and the total for the decade was \$3,138,529, while in 1883 there were imported \$447,996 worth, showing that there was 94 per cent. more cutting done in 1889 than in 1880, but markedly more in 1882 and 1885. This large increase of importation is due to the fact that in the years 1882 to 1885 a number of our jewelers opened

diamond-cutting establishments, but the cutting has not been profitably carried on in this country on a scale large enough to justify branch houses in London, the great market for rough diamonds, where advantage can be taken of every fluctuation in the market and large parcels purchased, which can be cut immediately and converted into cash; for nothing is bought and sold on a closer margin than rough diamonds. The census reports for 1890 also showed, as will be seen by the following table kindly furnished by the Government department, that there had been a remarkable increase in the imports of diamonds and precious stones into this country during the last few years:

| Years ending June 30— Value. | Years ending June 30— Value. |
|------------------------------|------------------------------|
| 1870..... \$1,768,324        | 1881..... \$8,320,315        |
| 1871..... 2,849,493          | 1882..... 8,377,200          |
| 1872..... 2,939,155          | 1883..... 7,598,176          |
| 1873..... 2,917,216          | 1884..... 8,712,315          |
| 1874..... 2,158,172          | 1885..... 5,628,916          |
| 1875..... 3,224,319          | Years ending Dec. 31—        |
| 1876..... 2,409,516          | 1886..... \$9,254,438        |
| 1877..... 2,110,215          | 1887..... 10,686,403         |
| 1878..... 2,970,469          | 1888..... 10,223,630         |
| 1879..... 3,841,335          | 1889..... 11,705,809         |
| 1880..... 6,690,912          |                              |

The imports from 1870 to 1879, inclusive, amounted to \$26,098,203, whereas from 1880 to 1889, inclusive, the imports amounted to \$97,193,114, more than three times as much as were imported the previous decade.

**DIAN DE POITIERS** (1499-1566), the favorite of Henry II, of France. He permitted her to control his foreign policy and exercise royal power.

**DIAPASON REGULATOR.** The French, who give the name of *diapason* to the tuning-fork, have lately made attempts to use that instrument in connection with clock-work, partly as a means of counting very small intervals of time. M. Duhamel made an arrangement in which a cylinder, by means of a screw-tapped end, was made to advance a little in the direction of the axis; this cylinder was covered with blackened paper and was rotated by means of clock-work. A diapason had a style or marker, made of a small bit of pointed spring, fixed to the end of one of the prongs. On the diapason being sounded in the usual way, and the spring placed lightly against the cylinder, the style traced a sinuous white line on the black paper. The sinuosities became representatives of minute intervals of time. The diapason regulates the rate of motion of the train of wheels by the equilibrium of the vibration of the prongs, while the train of wheels tends to increase the time during which the prongs vibrate and sound. An index carried by an arbor round a dial may be made to recount or record the vibrations. Breguet's experiments have gone as far as instruments giving two hundred simple vibrations (one hundred double vibrations) per second.

**DIARY** (Latin, *diarium*, from *dies*, day), a daily record. It does not, however, comprehend every sort of daily record, but only such as have reference to the writer personally. In it the *littérateur* inscribes the daily results of observation, reading, or thought; to the merchant it serves the purpose of an order or a day-book, while the physician finds it indispensable as a register of engagements. The use of diaries has become so general that the making of them now forms an important branch of book-manufacture.

**DIAS, HENRIQUE**, a Brazilian soldier, born in Pernambuco, died in Recife, Aug. 31, 1661. In the Portuguese army he commanded a party of negroes, was wounded and captured, but allowed to escape because he was a negro. In the next battle his bravery was rewarded by the cross of the legion of Christ, and the command of the colored troops. His name is given to a regiment whose commander is always a negro.

**DIAS VIEIRA, João Pedro**, Brazilian statesman, born in Guimarães, March 30, 1820, died Oct.

30, 1870. He was a lawyer, an orator, a member of the provincial assembly of Maranhão; held the offices of attorney-general of the treasury, was governor of the province of the Amazonas, deputy to the chamber of representatives, minister of the navy, and of foreign affairs.

**DIATHESIS**, a Greek word signifying a disposition or arrangement, and applied by the old medical authors to the predisposition or constitution of the body which renders it prone to certain diseases.

**DIAZ DE SOLIS, JUAN**, a Spanish navigator, born in Leberija, Spain, in 1471, died in South America about 1516. He sailed from Cadiz in 1506, and following somewhat the course of Columbus, he discovered the coast of Yucatan, Bay of Campeachy, and in a subsequent voyage the Plate River. He was given the title of chief pilot of the kingdom, and designed a marine chart of the coast of America so far as it was then known. He met his death at the hands of cannibals while exploring the Plate River in a small boat.

**DIAZ, PORFIRIO**, president of Mexico, born in Axaca, Sept. 15, 1830; was educated in the institute of Axaca, and after studying law entered the army. He took part in the revolution of 1854 and in the three-years' "war of the reform," which commenced in 1857. In 1863 he was appointed commander of the army; Maximilian arrived in Mexico in April, 1864, and until his downfall in 1867, Diaz was leader of the Republican forces. On the establishment of the Republic Juarez was elected president; he died and Lerdo succeeded him. Diaz started a revolutionary warfare, which finally resulted in his own favor. The president fled the country, Iglesias became president *pro tem.*, and in the election of 1877 Diaz obtained the office. He ruled with wisdom and firmness till 1880, when Gen. Manuel Gonzalez was elected president. Four years later Diaz was reelected, and gave much attention to the financial condition of the country. In 1888 he was a third time elected president, and at the present time (1891) is holding the office. Gen. Diaz has displayed cruelty and a spirit of revenge, but his official acts are, in the main, judicious and statesmanlike.

**DIBBLE, SHELDON** (1809-45), an American missionary to Hawaii. He studied theology and was ordained in 1830, sailing for the Hawaiian Islands the same year. He visited the United States in 1837, but returned in 1839 to end his days in missionary labors. He wrote valuable works on historical and other subjects.

**DIBBS**, an English name for "jack-stones," a very ancient game played by boys and girls, and, according to Dr. Clarke, sometimes engaged in by old men in Russia. It consists of throwing up small bones or pebbles, and catching them first on the palm and then on the back of the hand. The antiquity of this simple kind of play is proved by figures on Grecian vases, in which females are seen kneeling and engaged in the sport.

**DICE** (plural of die), small cubes of bone or ivory marked on each side with black dots, from one up to six in number. They are employed in certain games of chance, such as backgammon; also in settling some dispute in which the decision is referred to the highest number thrown. The throwing of dice is affected by means of a small tubular box, which, held in the hand, is shaken at will by the player. When the dice are true cubes there is no plan by which any kind of shaking can bring out a desired number.

**DICEY, EDWARD**, an English editor, born in 1832. For a time he was editor of the London "Daily News," and in 1870 accepted the editorship of the



'observer." He has published several works descriptive of his travels in the East.

**DICHLAMYDEOUS**, a term in botany, applied to those flowers which have both calyx and corolla. DeCandolle divides dicotyledonous or exogenous plants into *Dichlamydeous* and *Monochlamydeous*.

**DICHOTOMOUS**, a botanical term formerly vaguely used to designate any appearance of branching by forking. See *Britannica*, Vol. IV, p. 93.

**DICKERSON, MAHLON** (1770-1853), an American statesman. He was admitted to the practice of law in 1793, and settled in Philadelphia. He held various political offices in Pennsylvania, and then removed to New Jersey, where he became judge of the Supreme Court and chancellor. In 1811 he became a member of the legislature and four years later was elected governor of the State. From 1817 to 1833 he was a member of the United States Senate, and from 1834 to 1838 was Secretary of the Navy. Subsequently he was on the bench of the United States district court of New Jersey, and in 1846-48 was president of the American Institute. He published *Speeches in Congress*.

**DICKINS, JOHN**, born in London, England, in 1746, died in 1798. He was one of the leading American Methodist preachers of his day. He sided in founding Cokesbury College and the Methodist Episcopal Book Concern.

**DICKINSON, ANNA ELIZABETH**, an American orator and author, born in 1842. She made her first public speech in 1857, and from that time continued as a speaker on temperance, slavery and politics. She taught school from 1859 to 1860, and for the year succeeding was employed in the United States mint. She appeared as an orator in many States of the Union until 1876, when she left the lecture platform. Miss Dickinson has since written various plays and novels.

**DICKINSON, DANIEL STEVENS** (1800-66), an American statesman. He began the practice of law in Guilford, N. Y., in 1828, but in 1831 settled in Binghamton. In 1836 he was elected State Senator, and in 1842 became lieutenant-governor. In 1844 he was made United States Senator, and in 1852 he declined the office of collector of the port of New York. In 1861 he was elected attorney-general of the State, and subsequently became district attorney for the Southern district of New York. This position he held till his death.

**DICKINSON, JOHN** (1732-1803), an American publicist. He practiced law in Philadelphia, and became a member of the Pennsylvania assembly in 1764. He was a member of the first Continental Congress (1774), and at the beginning of the war enlisted as a private in the army, becoming a brigadier-general in October, 1777. In 1779 he was elected a member of Congress from Delaware, and in 1780 was a member of the assembly, and in 1781 became president of the State. From 1782-84 he was president of Pennsylvania. His publications were principally on political issues.

**DICKINSON, JONATHAN** (1688-1747), an American clergyman. In 1709 he became pastor of the church at Elizabethtown, N. J., where he remained until his death. In 1746 he was elected first president of the College of New Jersey. Among his publications are: *Reasonableness of Christianity* (Four Sermons), and *The True Scripture Doctrine Concerning Some Important Points of Christian Faith*.

**DICKINSON COLLEGE**, founded at Carlisle, Pa., in 1783. It is next to the oldest educational institution in the State, and was named after Hon. John Dickinson, "President of Pennsylvania." Its first president was Charles Nisbett, D. D. It was under Presbyterian control till 1833, when the division into Old and New schools brought such embarrass-

ments that it was transferred to the M. E. Church. There are three buildings. The library contains 26,000 volumes.

**DICKSON, SAMUEL HENRY** (1798-1872), an American physician. In 1819 he commenced the practice of his profession in Charleston, S. C. and in 1824 became professor of the institutes and practice of medicine in the Charleston Medical College. In 1847 he accepted the chair of professor of the practice of medicine in the University of New York, but three years later resumed his chair in Charleston. From 1858 until his death he was professor in Jefferson Medical College, Philadelphia, Pa. He published largely on professional, literary, and current topics.

**DICTIONARY**, a book containing the words, alphabetically arranged, which belong to any province of knowledge, with explanations of their meaning. Among the latest and most valuable works of this description published in the United States are *Webster's International Dictionary*, and *The Century Dictionary*, both lexicons of the English language. See *Britannica*, Vol. VII, pp. 179-193.

**DICYNODON**, the name given by Owen to a genus of fossil reptiles, whose remains have been found in Southern Africa. The true age of the rock in which they occur has not been ascertained, but the accompanying organisms seem to indicate that it is Triassic.

**DIDACTIC POETRY**, that kind of poetry which aims, or seems to aim, at instruction as its object, making pleasure entirely subservient to this. In the poems generally called didactic, the information or instruction given in verse is accompanied with poetic reflections, illustrations, episodes, etc. The *Georgics* of Virgil have been the model according to which the didactic poems have generally been composed.

**DIDELPHIS, or DIDELPHYS**. See *OPPOSSUM*, *Britannica*, Vol. XVII, p. 796.

**DIEFFENBACH, JOHN FRIED**, a celebrated Prussian surgeon, born in Königsberg in 1792, died in 1847. After serving as a volunteer in the war of liberation, and devoting some time to the study of theology, he began in 1816 the study of medicine and surgery. He took his degree in 1822, and commenced practice in Berlin, where he soon attained distinction as an operator, and in 1840 was appointed professor and director of clinical surgery. He displayed unusual skill in all the operations of the knife, and introduced many innovations, such as forming new noses, lips, eyelids, and other features, and cutting the muscles as a relief for squinting and stammering.

**DIEGO Y MORENO, FRANCISCO GARCIA** (1800-46), a Mexican Roman Catholic bishop. He was ordained in 1824, and from 1832 to 1840 was on a mission among the Indians in California. In 1840 he became bishop, and continued the labors of this office until his death.

**DIES NON JURIDICUS**, in law, a day on which courts are not held, and upon which no ordinary legal proceedings can be taken. In the United States the *dies non juridicus* are Sunday, New Year's Day, Washington's Birthday, Decoration Day, Independence Day, Christmas Day, and Thanksgiving Day.

**DIET**. Animal life requires food of such a nature as to compensate for the perpetual wear and tear of the tissues and at the same time to keep up the animal heat at its proper standard. Various classifications of the food of man have been at different times proposed, but the most generally accepted is that of Dr. Prout—in which the different kinds of food are grouped in definite chemical classes—and that of Liebig, which has reference

solely to the ultimate destination of the food in the animal economy. Dr. Prout classifies all kinds of food under these heads: (1) The *aqueous*; (2) the *saccharine*; (3) the *oily* or *oleaginous*, and (4) the *albuminous*, to complete which, we ought to add (5) the *gelatinous*, and (6) the *saline*. Liebig makes only two classes: (1) Those consisting of nitrogenized matters, which are adapted for the formation of blood, and which he terms the *plastic elements of nutrition*, and (2) the non-nitrogenized substances, which from their large amount of carbon serve (as fuel) to keep up the animal heat, and which he names the *elements of respiration*. See DIETETICS, Britannica, Vol. VII, pp. 200-13.

DIETERICI, FRIEDRICH, a German Orientalist, born in 1821. After studying the Oriental languages for years in Berlin, he spent 18 months under the instruction of a learned sheik in Cairo. He then traveled through Upper Egypt and Palestine, and in 1850 became professor extraordinary in the University at Berlin. He is the author of many works on Oriental subjects.

DIETERICH, JOACHIM FREDERICK CHRISTIAN, an eminent veterinary surgeon, born at Stendal, Prussia, in 1792. In 1830 he accepted a post in the general military school of Berlin, where in 1841 he was appointed professor in ordinary.

DIETRICH OF BERN, the name under which the Ostrogoth king, Theoderic the Great, appears in the German heroic legends. The word Bern signifies Verona, his capital.

DIETRICHSON, LORENTZ SEGELKE, a Norwegian poet, born in 1834. He traveled from 1858 to 1875, when he became professor of the history of fine arts in Christiania. His books are principally on art and its history, and are written partly in Norwegian and partly in Swedish.

DIGAMMA, an obsolete letter of the Greek alphabet, equivalent in sound to the English *v*. The digamma had disappeared as a character from the Greek language before the time of Homer.

DIGBY, a seaport town, county-seat of Digby county, N. S., situated on the Bay of Fundy. Ship-building is carried on, and large quantities of herrings and mackerel are exported.

DIGBY, KENELM HENRY (1800-80), an English author. He published works on various subjects, but the book that made his reputation was *Broadstone of Honour, or Rules for the Gentlemen of England* (1822). Among his later works are: *Catholicism, or Ages of Faith; Compitum, or the Meeting of Ways in the Catholic Church; The Lover's Seat*, and *Evenings on the Thames*.

DIGGER INDIANS. See INDIANS, AMERICAN, in these Revisions and Additions.

DIGITIGRADA (*Lat.*, finger-walking), in the zoological system of Cuvier, one of the tribes of the *Carnivora*, distinguished by walking on the toes alone, the heel not touching the ground. Among the digitigrade quadrupeds are included the most carnivorous of the *Carnivora*, the feline and the canine families, the hyenas, civets, weasels, etc. The weasel family (*Mustelidæ*), however, forms a connecting link, in respect to the character derived from the mode of walking, between the tribe *Digitigrada* and the tribe *Plantigrada*—being, in fact, semi-plantigrade, and not walking on the mere tips of the toes like the other *Digitigrada*.

DIHONG, or LANPO, a river of Tibet, the largest feeder of the Brahmaputra. It rises on the northern side of the Himalayas, and bursts through the great mountain chain, having pursued through an easterly course of 1,000 miles. See Britannica Vol. XXIII, p. 341.

DIJON MUSTARD. The celebrated Dijon mustard is worthy of note as a manufacture. Its pe-

culiar quality is a certain piquancy not found in any other mustard. The seed is always sown on cleared charcoal-beds in forests, and the soil gives one peculiar flavor to the mustard; another flavor is differently accounted for. The mustard, when in powder, is mixed with the juice of new wine, lending that pleasant acidity with which we are familiar. But to obtain precisely the degree of acidity, it is necessary that the grape be always in precisely the same state of unripeness—a degree more or less making all the difference.

DILEMMA. A true dilemma is defined by Whately as "a conditional syllogism with two or more antecedents in the major, and a disjunctive minor." The following dilemma, of the kind called destructive, will perhaps convey a clearer notion than any definition. "If this man were wise he would not speak irreverently of Scripture in jest, and if he were good he would not do so in earnest; but he does it, either in jest or earnest; therefore, he is either not wise or not good." There being two conclusions, one or the other of which your opponent must admit, he is in a manner caught between them; hence we speak of the *horns* of a dilemma.

DILETTANTE, in its original sense, an amateur, or lover of the fine arts. It is often used as a term of reproach, to signify an amateur whose taste lies in the direction of what is trivial and vulgar, or of a critic or connoisseur whose knowledge is mere affectation and pretense. It is sometimes assumed, in a spirit of self-depreciation, by those who are unwilling that their critical acquirements or artistic productions should be judged by the rules which would be applied to those of persons who had made a professional study of art. It was in this sense that it was assumed by the Dilettanti Society.

DILETTANTI SOCIETY, a body of gentlemen by whose exertions the study of antique art in England has been promoted.

DILIGENCE, the name given in France to a public conveyance of the nature of a stage-coach. It is a large strong vehicle, with four broad wheels, weighing about five tons, and is drawn by four stout horses at the rate of about six miles an hour. It consists of three chief compartments: The front, called the *coupé*, for three persons; the second, called the *intérieur*, for six persons; and, lastly, the *rotonde*, entered from behind, for six persons. Aloft, in front, is the *banquette*, where the *conducteur* is seated; and behind this, underneath a thick leather covering, passengers are sometimes huddled among baggage and goods, with little regard to their comfort. The system of diligences, however, has been latterly much broken up by railway transit.

DILKE, SIR CHARLES WENTWORTH, an English statesman and author, born in 1843. He was admitted to the practice of law in 1866, but spent two years in extensive travel. He was several times reelected a member of Parliament, and in 1880 became under secretary of state for foreign affairs. He has edited various periodicals, and published several books on his travels.

DILMANN, CHRISTIAN FRIEDRICH AUGUST, a German theologian and Orientalist, born in 1823. In 1860 he became professor of Oriental languages at Kiel, and in 1864 was transferred to the chair of Old Testament exegesis at Giesen, which in 1869 he resigned to become Hengstenberg's successor at Berlin. He is the author of numerous works on Ethiopic topics, and is unquestionably the first authority in Europe on Ethiopic languages.

DILLON, JOHN, an eminent member of the Irish Parliamentary party of Great Britain, son of John Blake Dillon, born in New York city in 1851. He was educated at the Catholic University of Dublin, entered Parliament for Tipperary in 1880, and has



represented East Mayo since 1885. He was twice imprisoned under the Coercion act of 1881, and has been repeatedly suspended by the House of Commons. While carrying the "plan of campaign" into operation he was arrested at Loughrea in 1886, and bound over in heavy securities to keep the peace, and in 1888 he was sentenced to six months' imprisonment in Tullamore jail. He afterwards made a tour of the Australian colonies, where he met with an enthusiastic reception, and collected large contributions to the funds of the Irish Nationalist party. He returned in 1890, and was arrested on a political charge, but escaped with Mr. William O'Brien to Cherbourg, France, and thence to the United States, where he was received by the friends of the Parnellite movement. Upon the division of the party he declared himself in favor of the retirement of Mr. Parnell from the leadership of the Irish party in Parliament. He soon returned to France, where he surrendered himself to the British authorities, and at the present writing (April, 1891) he is imprisoned in an Irish jail.

DILLON, JOHN BLAKE, born in Mayo, Ireland, in 1814, died in 1866. He studied theology at Maynooth, and law at Dublin, and was called to the bar in 1842. He helped to found the "Nation" newspaper. He was a prominent member of the "Young Ireland" party, and after the failure of the movement, he escaped to the Arran Islands; thence to France, and later to the United States, where he practiced law in New York city. He returned to Ireland in 1852, and was elected to Parliament in 1865.

DIMAN, JEREMIAH LEWIS (1831-81), an American Congregational clergyman. From 1856 to 1860 he was pastor in Fall River, Mass., and from 1860 to 1864 in Brookline. In 1864 he became professor of history and political economy in Brown University. He contributed to many periodicals.

DIMIDATION, in heraldry, a mode of marshaling arms, adopted chiefly before quartering and impaling, according to the modern practice, came into use, and subsequently retained to some extent in continental heraldry. It consists in cutting two coats-of-arms in half by a vertical line, and uniting the dexter half of the one to the sinister half of the other. Coats of husband and wife were often so marshaled in England in the 13th and 14th centuries.

DIMINUTIVES, forms of words, chiefly of substantives, in which the primitive notion has become lessened or diminished, as *hillock*, a little hill. There is, perhaps, no language without diminutives, and the most common method of formation is by the addition of a syllable. This, however, is not the only method; *tip* from *top*, by attenuating the vowel, and *kid* from *goat*, are as genuine diminutives as *hillock*.

DIMITY, a stout, figured cotton fabric. The figure or stripe is raised on one side, and depressed on the other, so that the two faces present reversed patterns. Dimity is commonly white, or of a single color; but variegated dimities are made.

DINARIO ALPS, that branch of the Alpine system which connects the Julian Alps with the western ranges of the Balkan.

DINDORF, WILHELM (1802-83), a German philologist. In 1827 he became an extraordinary professor at Leipsig, but resigned in 1833 to devote himself entirely to literary activity. He made many contributions of the first value to Greek scholarship, especially in the region of dramatic poetry.

DINGELSTEDT, FRANK VON, a German poet, born in 1814; royal librarian at Stuttgart, and director of the theater in Munich, and of the Court Opera House in Vienna. He died in 1881.

DINSMOOR, ROBERT (1757-1836), an American poet. He enlisted in the Revolutionary Army at the age of eighteen, and after the war settled down as a farmer. His writings are short poems, principally in the dialect of his ancestors, the Scotch.

DINWIDDIE, ROBERT (1690-1770), a colonial governor of Virginia. He was employed as surveyor of customs for the colonies until 1752, when he became lieutenant-governor of Virginia, and shortly afterwards governor. He was recalled in January, 1758, charged with appropriating to his own use £20,000 of the public money.

DIOCESE, a term signifying in general administration, but usually understood to mean the territory over which a bishop exercises ecclesiastical jurisdiction.

DIOECIOUS: in botany, a term applied either to plants or flowers when not only the flowers but also the individual plants are unisexual, that is, when male and female flowers are produced upon separate plants. See *Britannica*, Vol. XX, p. 428, for *DIOECISM* in plants.

DIOMEDE ISLANDS, a group of islands about the middle of Bering Strait, forming, as it were, a number of stepping-stones between the most easterly point of Asia and the most westerly point of America. Their names are Fairway, Crusenstern, and Ratananow.

DION, an austere and virtuous statesman of Syracuse, who became obnoxious to the tyrant Dionysius the Younger, and was banished; in revenge for which he attacked Syracuse with a body of warriors in 357 B. C. He was assassinated in 354 B. C.

DIPLOPHANTINE ANALYSIS, that section of the theory of unlimited or indeterminate problems which attempts to find rational and commensurable values answering to certain equations between squares and cubes.

DIPLOACANTHUS, a genus of fossil ganoid fishes, peculiar to the Old Red Sandstone, in which six species have been found. The body was covered with very small scales, and the tail was atterocerical. There were two dorsal fins, which, with each of the other fins, were furnished with a strong spine in front, the base of which was simply imbedded in the flesh, as in the dog fish, and not articulated, as in the siluroids. The head was large and the mouth wide, and opening obliquely.

DIPLOGRAPSUS, a genus of fossil zoophytes, differing from the Graptolite in having a double series of cells. They are found in great abundance in the anthracitic shales of the Silurian measures.

DIPLOMATICS, the science of ancient writings. The term has latterly given way to the more convenient and descriptive term, *paleography*.

DIP OF THE HORIZON, a term in navigation used to denote the difference between the altitudes of a heavenly body as seen from the sea level and the horizon.

DIPPING NEEDLE. If a magnetic needle be supported so as to be free to move vertically, it does not at most places on the earth's surface rest in a horizontal position, but inclines more or less from it. If the vertical plane in which the needle moves is the magnetic meridian of the place, the angle between the needle and the horizontal line is called the dip, or inclination of the needle.

DIPSAS, a genus of non-venomous serpents of the family *Colubridæ*, of very elongated form, and with a thick, broad, and obtuse head. They are tree snakes, inhabitants chiefly of the warm parts of Asia and America. One species only, *Dipsas fallax*, somewhat doubtfully referred to this genus, occurs in Southern Europe.

**DIPTERUS**, a genus of fossil ganoid fishes, peculiar to the Old Red Sandstone, in which two species have been found. They derive their name from their most striking characteristic—namely, the double anal and dorsal fins, which are opposite each other. The head is large and flattened, the teeth sub-equal, the scales perforated by small foramina, and the tail heterocercal.

**DIRECTOR**, one of a number of persons appointed to conduct the affairs of joint-stock undertakings, such as banks, railways, water and gas companies, fire and life insurance companies, and various kinds of manufacturing and trading concerns. The office of a director is in all cases one of more or less responsibility, sometimes of considerable risk, and, according to commercial maxim, ought not to be accepted lightly, or for the mere honor which is supposed to be incidental to the position.

**DIRECTORY**, a book containing the names of the inhabitants of any place, arranged alphabetically, with their places of business, abode, etc.; also, the board of directors of a corporate body.

**DIRECTRIX**, a right line perpendicular to the axis of a conic section, in reference to which its nature may be defined.

**DIRK**, a short dagger, which at various times and in various countries has been used as a weapon of offense. In the naval service at the present day, the dirk belted and buckled to the right side is worn by officers rather for ornament than for use.

**DIRK-HARTOG ISLAND**, an island off the western coast of Australia. With two smaller islands it forms the breastwork of Shark's Bay, one of the most commodious inlets on that coast.

**DISABILITY**, **LEGAL**, is either absolute, which wholly disables the person from performing any legal act—for example, outlawry, excommunication, attainder, alienage—or partial, such as infancy, coverture, lunacy, drunkenness, and the like. It may arise from the act of God, of the law, of the individual himself, or of his ancestors, or the person from whom he inherits.

**DISBAR**, to expel from the bar; to deprive an attorney, or counselor-at-law of his license to practice before the courts.

**DISCLAIMER**, in law, a denial, disavowal, or renunciation of some claim, title, estate, or right, which has been alleged or offered.

**DISCOID**, anything having the form of a disk. *Discoid flowers* are compound flowers consisting of tubular florets, like the pansy.

**DISCIPLES OF CHRIST**. See **RELIGIOUS DENOMINATIONS IN THE UNITED STATES**, in these *Revisions and Additions*.

**DISEASES OF PLANTS** form a subject of study interesting equally in its scientific and its economic or practical relations, but in regard to the most important parts of which much obscurity and uncertainty still exist. Enough, indeed, is known to show that, as might have been expected, an analogy subsists between the kinds of disease to which plants are subject and those of animals, both in their nature and their causes, yet with wide differences, according to the difference between animal and vegetable life. Plants, like animals, are liable to suffer from unsuitable external circumstances, as of temperature, drought, moisture, etc. They are liable, like animals, to suffer from deficiency of food, from excess of it, or from being compelled to subsist on improper kinds of it, or too exclusively on some particular kind.

**DISHONOR OF A BILL**. When the drawee, or person on whom the bill is drawn, declines to accept or to pay it, he is said to dishonor it. The act of drawing or of indorsing a bill implies an obligation to

pay it in the last instance, and the person in whose favor it is drawn has thus recourse against the drawer and indorsers, should the drawee fail to accept or to pay. In order to preserve this recourse, however, it is indispensable that notice of dishonor shall be given to the drawer and indorsers. No particular form of notice is requisite.

**DISFRANCHISEMENT**: in law, the deprivation of privileges of citizenship, or the expulsion of a member of a corporation, so as to deprive him of his corporate rights as such.

**DISK**, in botany, a part intervening in some flowers between the stamens and the pistil. It seems in most cases to represent an inner whorl of stamens variously modified. It is often a mere ring; sometimes it exhibits a whorl of scales or of rudimentary stamens, or even of petal-like appendages; sometimes it rises into a sort of cup around the pistil; sometimes, as in the rose, it assumes the form of a waxy lining of the tube of the calyx. It is often glandular, and secretes a honey-like fluid. It is one of the parts included under the comprehensive term *nectary* by the older botanists. See *Britannica*, Vol. IV, p. 134.

**DISLOCATION**: in geology, see *Britannica*, Vol. X, pp. 261, 301, 372, and Vol. XVI, p. 442.

**DISMANTLE**, the operation which a ship undergoes when she is to be laid up in ordinary, or placed out of service. She is unrigged; the yards and most of the ropes are removed, and the upper masts are taken down.

**DISMAS**, Sr., the name which Romish tradition has attached to the "good thief." He is represented with a cross beside him.

**DISPART**: in gunnery, a mark set upon the muzzle of a gun to aid the gunner in obtaining a line of sight truly parallel with the axis of the bore. Strictly, the dispart is not the mark itself, but a distance or quantity denoted by the mark; and "to dispart" a gun is to determine this distance. It depends mainly on the relation between the diameter of the breech and that of the muzzle.

**DISPENSARY**, a charitable institution, supported by private contribution, or by the government, to supply the poor with medicines and medical advice free of charge. The first institution of this nature, the Royal General Dispensary, was started in London in 1770, and in 1861 relieved about 20,000 persons. In 1850 nearly 150,000 were relieved by 35 dispensaries in that city; and now the number of free patients is believed to have risen to over one-fourth of the entire population of London, or more than 1,000,000. In the United States a similar proportion is observed. In New York city, in a population of 1,513,501 in 1890, about 350,000 patients were relieved; in Philadelphia, with 1,044,894 inhabitants, there were in 1890 about 200,000 patients aided; in Brooklyn, out of a population of 804,377, about 200,000 received help; and in Chicago, with a population of 1,098,576, the number of dispensary patients probably exceeded 250,000. One or more dispensaries are now supported by nearly every important city in the world.

**DISPOSITION**, in art, differs from *composition*, inasmuch as the former has reference to the arrangement of the parts, and the latter to the effect of the whole.

**DISPOSITION**, in music, a term now used in organ-building, adopted from the German, meaning the arrangement and combination of the stops on the different rows of keys and pedals, with the pitch of each stop, or length of the lowest CC pipe.

**DISRAELI**, BENJAMIN, Earl of Beaconsfield (1805-81), an English author and statesman. In 1837 he was elected a member of the House of Com



mons as a Conservative for the borough of Maidstone. In 1848 he became the leader of the Young England party, and in 1852 the Earl of Derby offered him the post of chancellor of the exchequer. In 1858 he was again summoned to fill the position of chancellor of the exchequer during the second administration of Lord Derby. In 1866, after seven years of Liberal reign, the Earl of Derby again returned to power, and Mr. Disraeli once more accepted the post of chancellor of the exchequer. In 1868 Disraeli succeeded Lord Derby as Premier, but resigned the following year. In 1874 he returned to power, and at the first session of Parliament in 1877 he took his seat in the Upper House as Lord Beaconsfield. In 1880, on account of large Liberal gains in Parliament, Lord Beaconsfield resigned, and Mr. Gladstone became Premier in his stead. He was the author of several popular novels, among them, *Henrietta Temple*, *Coningsby*, *Sybil*, and *Tancred*.

**DISSECTION WOUNDS.** The practical study of anatomy is attended with certain dangers, which, however, during the last quarter of a century have been much lessened. The atmosphere of the dissecting-room, now comparatively pure by the application of proper ventilation and other sanitary measures, was less than a generation ago too commonly loaded with noxious emanations, which more or less poisoned the blood of those who continuously inhaled it, and consequently produced nausea, sickness, diarrhoea, a bad taste, and other symptoms. Dissection wounds, which are always attended with a certain amount of risk, were rendered more dangerous by the low state of the system induced by the depressing influence of the surrounding air.

**DISSENTERS,** the common appellation of those who dissent or differ from the established church of their country in any of its doctrines, or in any part of its constitution, and therefore separate themselves from it. Although sometimes employed as a sufficiently appropriate designation of the sects which separated themselves from the general body of the church, during the early and Middle Ages, the term Dissenters belongs to modern times and Protestant countries; the claims of the Roman Catholic church, where dominant, having always been asserted in a manner incompatible with the existence of recognized religious dissent. The measure in which the rights of Dissenters are conceded by law may be esteemed a fair test of the religious liberty enjoyed in a country and of the general enlightenment of a people. The term Dissenters is of English origin and growth, although its almost exact equivalent may be said to have existed in Poland in the name *Dissidents*, a term which first appears in the acts of the Warsaw Confederation of 1573, and there denotes the Polish Protestants, in contradistinction to the members of the established Catholic religion. After 1632 the term Dissidents was applied in Poland to all who were not Roman Catholics, as Lutherans, Calvinists, Greeks, Armenians, etc. In England the term Dissenters appears to have come into use in the 17th century, as synonymous with *Nonconformists*; and from England its use was transferred to Scotland in the 18th century, after the Secession church had been founded in that country. It is usually applied to those who agree with the Established church in the most essential doctrines, but differ from it on some minor point, or on questions of church government, relation to the State, rites, etc.; as in England to Presbyterians, Independents, and Baptists.

**DISSEPIMENT,** in botany, the partition between two carpels in an ovary or fruit composed of

a number of carpels. A dissepiment is formed by the union of the sides of two carpels. Sometimes dissepiments meet in the center or axis, completely dividing the ovary or fruit into cells; sometimes they are partial, appearing as mere projections from the outer walls of the ovary or fruit, and leaving it one-celled. Many ovaries and fruits exhibit partitions not formed by the union of the sides of carpels; these are sometimes called *spurious dissepiments*.

**DISTANCE.** The limit of view in a picture, or point of distance, as it is called in perspective, is that portion of the picture where the visual rays meet, the middle distance being the central portion between the extreme distance and the foreground. The art of producing on the eye the effect of real distance, in so far as it is not accomplished by mere mechanical rules, is one of the most subtle branches of landscape-painting, and cannot be acquired otherwise than by long experience and a careful study of the effects of light and shade.

**DISTICH,** the classical name given to any two lines, but especially to a hexameter and pentameter, making complete sense. It was much used by the Greeks and Romans as a vehicle for the expression of single thoughts and sentiments, and hence became almost exclusively employed for the classical epigram. The great poets of modern Germany, Goethe, Schiller, etc., have also shown a fondness for the distich, and remarkable skill in the use of it. A collection of moral maxims in Latin, ascribed to a certain Cato Dionysius, are called *Disticha*, and were highly popular during the Middle Ages.

**DISTILLED WATER** is the condensed product obtained by the distillation of water. All natural waters, even rain-water, contain certain saline matters (common salt, etc.) in a state of solution, from which they can only be completely freed by the process of distillation. The characters of distilled water are, that it possesses a mawkish, insipid taste, without color, and when evaporated to dryness in a vessel it ought to leave no residue.

**DISTILLED WATERS** are obtained by distilling water along with the parts of plants containing essential oils. Rose-water and lavender-water are familiar examples.

**DISTORTION.** The rules of perspective impose certain conditions in the delineation of natural objects, and when the image formed by a lens on a focusing screen does not fulfill those conditions it is said to be distorted. The effect of distortion is to render all straight lines curvilinear which do not pass through the center of the lens, and also so to alter the relative proportions of objects in the picture as to be opposed to the principles of true perspective.

**DISTRICT ATTORNEYS OF THE UNITED STATES.** This name originated in England, when districts in which to hold courts of oyer and terminer (*q. v.*) were assigned to certain judges. In the United States the district attorneys represent the States and general government, in circuit and district court, civil and criminal, and in the prosecution of crimes and misdemeanors.

**DISTRICT OF COLUMBIA,** the seat of the United States Government. For its history, government, earlier statistics, etc., see *Britannica*, Vol. VI, pp. 163-69. In 1890 the area of the District was 70 square miles, and the population 230,392, as officially reported by the census of that year. Of this population the city of Washington contained 228,160. The inhabitants of the District are chiefly occupied in the transaction of the nation's business the number directly engaged in the service of the Government and drawing their pay from the

national treasury being estimated at 16,000. The local government is a municipal corporation, the executive consisting of three commissioners, two of whom are nominated by the President of the United States from civil life, and the third detailed from the United States Army. This latter must be an officer of the corps of engineers, and while acting as one of the commissioners of the District has no other duties to perform. The two civil commissioners are required to give bonds in the sum of \$50,000 each for the faithful performance of their duties, and receive a salary of \$5,000 each per annum. The District has no municipal legislative body, and its citizens have no right to vote either in national or municipal concerns. All subordinate municipal officers are appointed by the commissioners, while the judiciary, recorder of deeds, register of wills, notaries-public, justices of the peace and commissioners of deeds are appointed by the President of the United States. From 1871 to 1874 the executive consisted of a governor, Henry D. Cooke occupying the office from 1871 to 1873, and Alexander Shepard from 1873 to 1874.

The enrollment in the public schools of the District of Columbia for the year 1880 numbered 26,439, and for the year 1890, 36,906, being a gain for the decade of 39.59 per cent. The enrollment in private schools Jan. 15, 1891, was 5,509, and in parochial schools, 2,402. For information regarding the public buildings, parks, monuments, charitable institutions, etc., see WASHINGTON, in these Revisions and Additions.

**DITTANY** (*Dictamnus albus*), a genus of plants of the natural order *Rutaceæ*, having a short five-partite calyx, five somewhat unequal petals, ten stamens, and five 1-3-seeded follicular capsules cohering at the base. The common dittany or fraxinella, a native of sunny mountains and rocks, and dry mountain forests of Southern Europe, especially in calcareous soils, is very generally cultivated as a garden-flower.

**DITCH**, one of the most important defense works of a fortress. It is a broad and deep trench, that may either be kept dry or filled with water; in practice it is usually dry.

**DITCH**, in agriculture, a trench usually made along the sides of fields, so that all the drains may be led into it. See AGRICULTURE, Britannica, Vol. I, p. 328.

**DIVERS** for pearls descend through the water with their feet on a stone attached to a rope, the other end of which is made fast to a boat. They carry a basket and a knife, gather the oysters with all speed, and ascend by the rope. This rude mode of diving is now but little used, save in the pearl and sponge fisheries.

Modern inventions enable the diver to remain below water for an almost indefinite time. Clad in an air-tight suit of rubber, his feet shod with heavy leaden plates, his head encased in a helmet furnished with pipes to supply fresh air and carry off that which expired, the depth to which a diver can descend is only limited by the pressure of water above him. The diver is connected with those above him by a cord, so that by a pre-arranged series of signals, he may signify his desire for more or less air, to be either lowered or hauled up, etc.

**DIVIDEND**, the sum which is appointed to creditors from the realized assets of a bankrupt estate, and which is at the rate of so much per cent. of the claims. The half-yearly interest on the public funds, and periodical profits on shares in joint-stock undertakings, are also called the dividends, the latter being usually declared half-yearly by order of the directors. Occasionally the dividends do

not exhaust the profits, and the surplus is allowed to accumulate until it is paid to the shareholders as an extra dividend, called a bonus.

**DIVIDERS**, instruments for drawing circles and other curves, and for marking distances; they consist of two or three bars joined by a hinge.

**DIVISIBILITY**, that property of quantity, matter, or extension through which it is either actually or potentially separable into parts. Whether matter is or is not indefinitely divisible is a question which has occupied the minds of philosophers since very early times. There is no doubt that, abstractly speaking, it is indefinitely divisible. We cannot conceive any body or space so small but that we can subdivide it in imagination, and thus figure to ourselves bodies and spaces still smaller; and practically we know that the sub-division of matter is carried in Nature far beyond appreciation either by our senses or by calculation. The diffusion of odors through the air for long periods from odoriferous bodies without their suffering any sensible change of weight, and the tingeing of great quantities of fluid by very minute portions of coloring matter, are cases commonly appealed to in proof of the extreme fineness of certain material particles; while, by experiment, it is shown that there is no particular limit to the divisibility of even the most solid substances. Thus, an ounce weight of silver, gilt over with eight grains of gold, has been drawn out into a wire 13,000 feet long, which was all its length covered with the gold; and a tube of glass presented to the blow-pipe has been drawn out until it became fine as a silk fiber, or  $\frac{1}{1000}$  of an inch thick, still retaining its character as a tube with a distinct interior and exterior surface. In fact, in theory great and small are mere terms of relation; under the microscope, objects invisible to the eye appear of considerable bulk; and, as Sir John Herschel, in his celebrated *Introduction to the Study of the Physical Sciences*, has put it, there is no reason why a mote in a sunbeam should not be in itself a world.

**DIVISION**, in military affairs, one section of an army, indefinite in point of numbers, but established as a matter of convenience. It often comprises infantry, cavalry and artillery, and is in effect a small army in itself, commanded by a general officer. In the United States Army, it is composed of two or more brigades under command of a general.

**DIVISION, NAVAL**, formerly a secondary group of ships in a large fleet, generally three to a squadron. In a very large and complete fleet there might be as many as nine admirals, or flag-officers, commanding nine divisions in three squadrons of three divisions each. The distinction of squadron has now been abolished, and individual ships are too gigantic to allow of large numbers being maneuvered in one fleet.

**DIVISION OF LABOR**, or **DIVISION OF EMPLOYMENT**, a term often used by political economists to express a means by which labor is economized; or, as another method of stating the same result, by which production is increased. The problem of a division of labor is to so adjust matters in any given community that each member of it shall work, or be able if he wishes to work, with the greatest possible results. In practice it is, like most other arrangements, apt to be too broad or too narrow. The term, "jack of all trades and master of none," expresses the truth that people who try too many things are not likely to be adepts in any. On the other hand, few people can do any sort of work to great perfection unless it is part, as it were, of a group of functions for which they are more or less prepared.



**DIVORCE LAWS OF THE UNITED STATES.**  
For a discussion of the general subject of Divorce, see *Britannica*, Vol. VII, pp. 300-05. In the United States the power to grant divorces is in general exercised by the courts having equity jurisdiction, though the legislatures have the power unless prohibited by the State Constitution. The laws of the various States upon this subject are quite dissimilar, although adultery is recognized as cause for absolute divorce in all the States and Territories, except South Carolina, which has no divorce laws. In most of the States a previous residence is requisite, the period of such residence varying greatly. In North and South Dakota a residence of ninety days prior to the application is required; in Arizona, California, Indiana, Idaho, Nebraska, Nevada, New Mexico, Texas and Wyoming, a residence of six months; in Alabama, Arkansas, Colorado, Illinois, Iowa, Kansas, Kentucky, Maine, Mississippi, Minnesota, Missouri, Montana, New Hampshire, Ohio, Oregon, Pennsylvania, Rhode Island, Utah (both parties as husband and wife), West Virginia, Washington and Wisconsin, a residence of one year; in the District of Columbia, Florida, Maryland, Michigan, North Carolina, Tennessee and Vermont, a residence of two years; in Connecticut and Massachusetts, a residence of three years, if, when married, both parties were residents; otherwise five years.

Of the causes for which divorce will be granted physical inability is recognized as a sufficient ground in all the States except Arizona, California, Connecticut, Idaho, Iowa, Louisiana, New Mexico, New York, North Dakota, South Carolina, South Dakota, Texas and Vermont. In most of these States, however, physical inability renders the marriage voidable.

Willful desertion for a period of five years is recognized as a ground of divorce in Kentucky, Virginia, Wisconsin and Rhode Island, though in the latter State the court may decree a divorce where the desertion has been for a shorter period. In Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, Ohio, Texas, Vermont and West Virginia, desertion for three years is sufficient; in Alabama, the District of Columbia, Illinois, Indiana, Iowa, Michigan, Mississippi, Nebraska, Pennsylvania and Tennessee, two years; in Arkansas, California, Colorado, Florida, Idaho, Kansas, Kentucky, Missouri, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, Wisconsin and Wyoming, one year; while in Arizona an absence of six months will entitle the injured party to a decree. In all of these cases, however, the desertion must be willful.

Divorce may be granted upon the ground of habitual drunkenness in all the States and Territories except Maryland, New Jersey, New Mexico, New York, North Carolina, Pennsylvania, South Carolina, Texas, Vermont, Virginia and West Virginia.

Fraud in the procurement of the marriage is sufficient ground for granting divorce in Connecticut, Georgia, Kansas, Kentucky, Ohio, Pennsylvania and Washington.

Cruel and inhuman treatment is a sufficient ground in all the States and Territories except Maryland, New Jersey, New York, North Carolina, South Carolina, Virginia and West Virginia.

Imprisonment for felony, or conviction of felony is sufficient in all the States and Territories (with limitations) except Florida, Maine, Maryland, New Jersey, New Mexico, New York, Utah and South Carolina.

Willful neglect on the part of the husband to provide for his wife for three years will entitle her to a divorce in Delaware; for two years, in Indiana; for one year, in California, Colorado, Idaho, Nevada, North Dakota, South Dakota and Wyoming; for six months, in Arizona; and for no specified time, in Massachusetts, Michigan, Maine, Nebraska, New Hampshire, New Mexico, Rhode Island, Tennessee, Vermont, Washington and Wisconsin.

Other causes for which divorce may be decreed in different States are: Absence without being heard from for three years, in New Hampshire; for seven years, in Connecticut and Vermont; ungovernable temper, in Kentucky; habitual indulgence in violent and ungovernable temper, in Florida; attempt to murder the other party, in Illinois and Tennessee; "cruel treatment, outrages or excesses such as to render their living together insupportable," in Arkansas, Kentucky, Louisiana, Missouri, Tennessee and Texas; indignities, such as render life burdensome, in Missouri, Oregon, Pennsylvania, Tennessee, Washington and Wyoming; indulgence in opium habit, in Massachusetts; husband notoriously immoral before marriage, unknown to wife, in West Virginia; Agetive from justice, in Virginia; immorality of wife before marriage, in Alabama, Georgia, Kansas, Kentucky, Iowa,

Maryland, Missouri, North Carolina, Tennessee, Virginia, West Virginia, Wyoming and Mississippi; gross misbehavior or wickedness, in Rhode Island; any gross neglect of duty in Kansas and Ohio; attempt on life, in Illinois; refusal of wife to remove into the State, in Tennessee; mental incapacity at time of marriage, in Georgia; three years with any religious society, that believes the marriage relation unlawful, in Massachusetts; becoming a member of any religious sect that believes marriage unlawful, and refusing to cohabit for a period of twelve months, in California, North Carolina, North and South Dakota (six months, in New Hampshire); insanity for ten years, in Washington, and for five years, in Wisconsin; insane since marriage, in Arkansas; vagrancy of the husband, in Maryland and Wyoming; divorce obtained by the other party in another State, in Kansas.

The above enumerated causes are all for full or absolute divorce, and condonation of adultery, or collusion or connivance in any of the instances, will prevent a decree. In Georgia a suit must be twice tried, at different terms, and the permanent verdict of two juries obtained, before divorce will be granted. In Washington the granting of an absolute divorce for any cause is left to the discretion of the court. In Wisconsin also the law practically allows the court to exercise its discretion. In New York but one cause for absolute divorce is recognized, that of adultery.

Arizona, Connecticut, Kentucky, Maine and Illinois, there are no restrictions upon remarriage by divorced persons. In Alabama, Georgia, Maryland, Mississippi and Virginia, the decree of the court may restrain the guilty party from remarrying. In Maine parties cannot remarry without permission of the court. In Massachusetts either party may remarry, but the defendant must wait two years. In Vermont the defendant must wait three years; in Missouri, five years; in Nebraska, Oregon and Washington, the time allowed for an appeal. In Kansas and Minnesota either party must wait two years. In New York, North and South Dakota, the plaintiff may remarry, but the defendant, divorced for adultery, cannot do so during the life of the plaintiff unless the decree be modified by proof, and added that five years have elapsed since the granting of the decree, that plaintiff has remarried, and that defendant's conduct has been uniformly good. In Delaware, Pennsylvania and Tennessee the defendant in an action for absolute divorce cannot marry the *particeps criminis* during the life of the plaintiff, nor in Louisiana at any time. See also **MARRIAGE LAWS**, in these Revisions and Additions.

**DIX, DOROTHEA LYNDE (1794-1887)**, an American philanthropist. She taught school in Boston, Mass., until 1834, when she visited Europe. In 1837 she returned to Boston, and devoted herself to investigating the condition of paupers, lunatics, and prisoners. During the civil war she was superintendent of hospital nurses. She published on various topics.

**DIX ISLAND**, an island 10 miles southeast of Rockland, Me. It consists of 55 acres of the best granite. A large number of men employed in the quarry live on the island. From this place was obtained the building stone used in constructing the treasury at Washington and the postoffice and court-house in New York city.

**DIX, JOHN ADAMS (1798-1879)**, an American statesman. He served in the 14th United States infantry in 1813, and in the 21st infantry from 1814, as second-lieutenant. In 1819 he became aid-de-camp to Gen. Jacob Brown. In 1826 he was sent as special messenger to the court of Denmark. In 1828 he resigned from the army and began the practice of law. In 1830 he was appointed adjutant-general of the State of New York, and in 1833 became Secretary of State, and superintendent of common schools. In 1841 he was elected a member of the assembly, and from 1845 to 1849 was a United States Senator. He next became assistant treasurer of New York, and in 1861 was appointed postmaster of New York. The same year President Buchanan made him Secretary of the Treasury. At the beginning of the civil war he organized seventeen regiments, and was commissioned major-general of volunteers. In 1866 he was appointed naval officer of the port of New York, and the same year became minister to France. In 1872 he was elected governor of New York. Mr. Dix was also the president of various railroads.

**DIX, MORGAN**, an American Episcopal clergyman, born in 1827. He was ordained deacon in

1852, and the following year priest. In 1855 he became assistant minister in Trinity parish, New York. In 1859 he was made assistant rector, and three years later rector of the same parish. He has published extensively on religious and other subjects.

DIXON, a railroad city and county-seat of Lee county, Ill., situated on the Rock River. It has good water-power, flouring-mills, and factories.

DIXON, ARCHIBALD (1802-76), a United States Senator. He studied law, and was admitted to practice in 1824. He was a member of the Kentucky legislature in 1830 and 1841, and of the State Senate in 1836. From 1843 to 1847 he was lieutenant-governor, and from 1852 to 1855 United States Senator.

DIXON, JAMES (1814-73), a United States Senator. He began the practice of law in 1836, and was a member of the Connecticut legislature in 1837 and 1838, and again in 1844. From 1845 to 1849 he was a member of the United States House of Representatives, and from 1850 to 1857 was in the State Senate. In 1857 he became a United States Senator, continuing in this capacity until 1869, when he withdrew and traveled in Europe.

DIXON, JOSEPH (1799-1869), an American inventor. His first invention was a machine for cutting files, developed before he was twenty-one years old, and he was the first person to take portraits with the camera. He built the first locomotive with the double crank; he made extensive and most important inventions in lithography. He became most widely known as the inventor of plumbago or graphite crucibles.

DIXON, WILLIAM HEPWORTH (1821-79), a British author. At an early age he wrote verse for Douglas Jerrold's "Illuminated Magazine," and in 1844 became editor of a paper at Cheltenham. In 1846 he began the practice of law in London. From 1853 to 1869 he was chief editor of the "Athenæum." In 1866 and again in 1874-75 he visited the United States, spending his time in traveling and lecturing. He wrote extensively on numerous topics.

DIXON, WILLIAM W., a lawyer, born in Brooklyn, N. Y., June 3, 1838. He removed with his family to Quincy, Ill., in 1842, and to Keokuk, Iowa, in 1849; received a common school education, and entered the profession of law in Keokuk; went to Tennessee and Arkansas in 1860, and in 1862 crossed the plains to California; went to Nevada the same year, and to Montana in 1866. In 1879 he went to the Black Hills, remaining two years, and then settled in Butte City, Montana. In politics he is a Democrat, and was elected a member of the Montana legislature in 1871; was a member of the Montana constitutional conventions of 1884 and 1889, and in 1890 was elected a representative at large from Montana to the 52d Congress.

DIXON'S ENTRANCE, a strait one hundred miles long from east to west, on the northwest coast of America. It divides Queen Charlotte Island on the south from the Prince of Wales Archipelago on the north.

DIXWELL, JOHN (1607-89), a Parliamentary general under Cromwell, and one of the regicides. After the restoration he fled to Germany, and thence to New Haven, New England.

DIZIER, St., a town in the department of Haute-Marne, France. In 1544 St. Dizier resisted for a month the assaults of a Spanish army under Ferdinand de Gonzaga.

DJEZZAR, that is, "Butcher" the name given, on account of his cruelty, to Achmed Pasha, famous for his obstinate defense of Acre against Napoleon I. He was born in Bosnia about 1735, and died in 1804.

DOANE, GEORGE WASHINGTON (1799-1859), an American P. E. bishop. He graduated at Union College in 1818, was ordained deacon in 1821, and priest in 1823. In 1824 he became a professor in Trinity College, Hartford, Conn., and for a time was editor of the "Episcopal Watchman." In 1828 he became assistant rector, and two years later rector of Trinity church, Boston, Mass. In 1832 he was elected bishop of New Jersey. He founded St. Mary's Hall for the education of girls, and later, Burlington College for boys. He published numerous addresses, and a volume of poems.

DOANE, WILLIAM CROSWELL, an American P. E. bishop, born in 1832. He was ordained deacon in 1853, and priest in 1856. He was for a time assistant to his father, George Washington Doane, in St. Mary's church, Burlington, N. J. Subsequently he was rector of that church; for three years rector of St. Barnabas free church in Burlington; of St. John's church, Hartford, Conn., in 1863-67; and then of St. Peter's church, Albany. He was consecrated bishop of the new diocese of Albany in 1869. He has since founded in Albany the Cathedral of All Saints, the Sisterhood of the Holy Child Jesus, St. Agnes School, and the Child's Hospital. He has written some on religious topics.

DOBBS, ARTHUR (1684-1765), an American colonial governor. He was governor of North Carolina from 1754 to 1765. He wrote *Trade and Improvement of Ireland*; *Capt. Middleton's Defense*; and *An Account of the Countries Adjoining to Hudson's Bay*.

DOBBS FERRY, a summer resort on the Hudson River in Westchester county, N. Y., 20 miles north of New York city. It contains remains of military works built about 1776.

DOBSON, AUSTIN, an English poet and critic, born in 1840. Since 1856 he has been connected with the board of trade, and is now (1891) at the head of an important bureau. He first began to write at the age of twenty-four, and has since published much in both prose and verse.

DOCKET: in general, a brief or abstract; in law, a calendar of causes ready for hearing or trial, prepared for the use of the courts by the clerks.

DOD, ALBERT BALDWIN (1805-45), an American educator. He taught from 1822 to 1826 in Fredericksburg, Va., when he entered the Princeton Theological Seminary, and was licensed to preach in 1829. From 1830 till his death he was professor of mathematics in Princeton College.

DOD, THADDEUS (1740-93), an American Presbyterian minister. He was licensed to preach in 1775. He preached at first in Virginia, and then in Pennsylvania. He founded a school in 1782, and was a teacher in it until 1787. He was one of the founders and the first president of Washington College, Pa.

DODD, EDWARD MILLS (1824-65), an American missionary to Smyrna. He became a Presbyterian minister in 1848, and sailed for Smyrna in 1849, representing the American board on a mission to the Jews at Salonica. After three years he returned to the United States, but again sailed for Smyrna, and from 1855 continued his labors among the Armenians. In 1863 he was transferred to Marsovan, where he remained until his death.

DODECATHEON, a beautiful American plant, order *Primulaceæ*, with twelve nodding blossoms.

DODGE CITY, the county-seat of Ford county, Kan., on the Arkansas River, 302 miles southwest of Topeka, on the Atchison, Topeka and Santa Fé railroad. It has a Presbyterian College, waterworks, and electric lights.

DODGE, AUGUSTUS CESAR (1812-83), a U. S. Senator. He served in the Winnebago war of 1827,



and the Black Hawk war of 1830. He was registrar of the land-office at Burlington, Iowa, in 1838-39, and a delegate to Congress from 1840 to 1847. He served as a United States Senator from 1840 to 1855, and minister to Spain from 1855 to 1859.

DODGE, GRENVILLE MELLE, an American soldier, born in 1831. He was engaged in railroad surveys until 1854; in 1861 joined the army, distinguished himself on many occasions, and became major-general in 1864. He resigned from the army in 1866, became chief engineer of the Union Pacific railroad, and has since been constantly employed in building railroads in the United States. He was a member of Congress from 1867 to 1869.

DODGE, HENRY (1782-1867), an American soldier. He was a member of the United States Army from 1812 to 1836, when he became governor of Wisconsin Territory and superintendent of Indian affairs. From 1841 he was a delegate to Congress for two terms. In 1846 he again became governor of Wisconsin, and after the admission of that State to the Union was made one of its first United States Senators, serving from 1848 to 1857.

DODGE, MARY ABIGAIL, an American authoress, born about 1830. She was for several years from 1851 instructor in physical science in the Hartford, Conn., High School. Subsequently she was a frequent contributor to prominent magazines, under the pen-name of "Gail Hamilton." She has published numerous novels, and juvenile books.

DODGEVILLE, the county-seat of Iowa county, Wis., situated in a region which produces lead and copper.

DODONA, a city of Epirus, the seat of the oldest Grecian oracle, situated in one of the wildest districts southwest of the Lake of Janina. The Greek and Egyptian accounts of its origin differ. The priests of Jupiter in Egyptian Thebes related that a party of Phœnicians carried from that city two holy women, one of whom was sold in Libya, the other to the Greeks, and that these women founded the oracles at Dodona and Ammon. The inhabitants of Dodona claimed that two black doves took their flight from the city of Thebes in Egypt, one of which flew to Libya and the other to Dodona; that the latter perched upon an oak, and with a human voice commanded that an oracle should be founded on the spot. Though the city of Dodona was destroyed in 219 B. C. by the Ætoliens, it recovered at a later period; was visited by the Emperor Julian on his march to Persia, and was in existence in the 6th century A. D. See *Britannica*, Vol. XIII, p. 565.

DODWORTH, HARVEY B., an able orchestral leader, band-master, and musical composer, born in Sheffield, Eng., in 1822. He emigrated to America with his parents in 1828, and was one of the earliest projectors of the New York Philharmonic Society, of independent bands for out-door concerts, and for music on public occasions, in that city. He gave great promise of excellence when but three years old; was a leader at 17, and became subsequently the conductor of orchestras—advancing to public notice and favor many of his performers, and maintaining a leading position in the musical world of America. He was among the first to prompt the concerts at Central Park, New York, and during the summer of 1875 he conducted the popular performances at Madison Square Garden.

DOESBURG (*Drususburg*), a town in the Netherlands. An entrenched camp has been constructed on the northeast side between the Yssel and the Old Yssel, which here unite.

DOGS. For a full discussion of this general subject, see *Britannica*, Vol. VII, pp. 324-31. The annual exhibitions which during the last few years

have been held at New York, Chicago, Boston, and other American cities, under the auspices of the Westminster Kennel Club, have fostered an increasing love for and knowledge of dogs, and have resulted in great improvement in the various breeds of this most companionable and affectionate type of all the brute creation. Competition in the champion and open classes has grown more and more spirited, and interest in these annual exhibitions has spread, until now polite society having put the stamp of its approval upon it, the "dog show" has become admittedly one of the fashionable happenings of the season. At the annual exhibit of the Westminster Kennel Club, held in Madison Square Garden in New York city in 1891, dogs of every breed and clime were listed in the catalogue, the collection being the finest ever brought together in this or any other country.

Corps of trained dogs are now attached to the different European armies, which will in the future be used, not only as guards for outpost work, but also to carry dispatches and ammunition.

By the statutory regulations of most of the States a dog is personal property; the owner may be indemnified in case of willful injury to the dog, and theft of the animal is a crime. Some States require, however, that the dog shall be licensed, or registered and collared, and therefore subject to taxation, before any property rights can attach to the animal. Unless duly authorized by law to kill unlicensed dogs, no one has a legal right to kill a dog belonging to another, unless he, or some one under his protection, or his animal, is in immediate danger of injury from the dog, or the dog is rabid, or has been bitten by a rabid animal. In general, the owner is liable in damages for any injuries caused by his dog; neither can he plead ignorance of the vicious habits of the animal in mitigation of the damages, every owner being bound to know the character of the dog he keeps. The owner of a vicious and dangerous dog may be indicted for keeping a nuisance, and be compelled to muzzle or kill the animal. Dog-racing is not illegal when for training purposes only, but if chance is the principal element it becomes a crime within the statutes against gaming.

Boards of health, or other civic authorities generally throughout the United States, issue edicts requiring all dogs to be kept muzzled for a certain number of weeks during the summer season, and authorizing any person to kill any dog found running at large not so muzzled. In many cities the police make raids on ownerless dogs and destroy them.

DOG-DAYS, anciently, the forty days between July 3 and August 11, derived from Sirius, the dog-star, which was supposed to cause the insufferable heat at this season. The ancient Thebans determined the length of the year by the number of risings of Sirius. At the season of the year when this star rose with the sun their combined influence was supposed to be productive of pestilential heat and baneful influences. Therefore, the Egyptians watched the conjunction of Sirius and the sun with feelings of hope and fear; for it foretold to them the rising of the Nile, or devastating droughts. Their dog-days extended from the 4th of August to the 14th of September. The rising of Sirius, however, has been so accelerated by the precession of the equinoxes during the passage of more than two thousand years, that the corresponding conditions for the ancient dog-days would not include them within the 3d of July and the 11th of August. It will readily be seen that our modern dog-days have no connection with the rising of Sirius or any other star, because no permanent data can be based

upon stars, whose positions are always changed by the falling back of the equinoxes.

DOGGETT, DANIEL SETH (1810-80), an American M. E. bishop. In 1829 he became an itinerant minister, and traveled through the Southern States. In 1866 he became a professor in Randolph Macon College, and in 1873 was made a bishop. He published *The War and its Close*.

DOGMA, originally, an opinion or proposition put in the form of a positive assertion, its truth being supposed to have been previously shown. In theology it was understood to signify a doctrine founded on Scripture, and advanced not for discussion, but for belief. But as this method of stating truth easily degenerates into the assertion of opinions without ground, and without regard to the aspect they may present to others, *dogma* and *dogmatism* have come in English to be almost synonymous with assertion without proof. In Continental theology, however, the word is still used without implying any censure, *dogmas* meaning simply doctrines; and this is the case in our own expressions, Dogmatic Theology, or Dogmatic, which is that branch of theology that treats of the systematic arrangement of the doctrines of Christianity.

DOGSBANE, the common name of a small genus (*Apocynum*) of the natural order *Apocynaceæ*, perennial herbs or under-shrubs. The dogbane of North America (*Androsæmifolium*), often called fly-trap, from the throat appendages of its corolla closing upon the insects which enter it, is of medicinal repute; similarly also its congener, *A. cannabinum*, or Indian hemp.

DOILY, or DOILEY, a small napkin used at a table for putting glasses upon during dessert. Some are highly ornamented. The name is said to be derived from the original maker, but more probably it is a modification of the Dutch *doekje*, a towel, and was introduced with the article from Holland.

DOIT, a small copper coin current in Scotland during the reigns of the Stuarts. It was a Dutch coin (*duit*), and in value the 16th part of a guilder.

DOKMEH, DAKHMA, or TOWER OF SILENCE, a receptacle for the dead used by the Parsees, consisting of a low stone tower, on top of which the bodies are exposed to the vultures till, being denuded of their flesh, their bones drop through the grating into a pit beneath. See PARSIS, Britannica, Vol. XVIII, p. 326.

DOLABRA, a rude ancient hatchet. *Dolabræ* are represented on the columns of Trajan and Antoninus, and abound in all museums. When made of flint, which was their earliest and rudest form, they are usually called *celts*.

DOLABRIFORM, having the shape of an ax or hatchet, as some leaves, and also certain organs of some shell-fish.

DOLBEAR, AMOS EMERSON, an American physicist, born in 1837. In 1866-67 he was instructor of chemistry at the University of Michigan, and in 1867-68 assistant professor of natural sciences in the University of Kentucky. From 1868 to 1874 he was professor in Bethany College, W. Va., and then became professor of physics and astronomy in Tufts College, College Hill, Mass. Prof. Dolbear has made numerous valuable contributions to science.

DOLES AT FUNERALS are of great antiquity. St. Chrysostom speaks of them as being given to procure rest to the soul of the deceased. On this ground, as well as on the score of general benevolence, the practice of making gifts to the poor at funerals was common until comparatively recent times; for it was continued, sometimes on a munificent scale, long after the custom of praying for the

dead had been abandoned on the introduction of reformed doctrines.

DOLICHOS, leguminous plants, with long pods which are used in the East and West Indies for food. Chinese *soy* is made from one variety.

DOLL, an image, usually representing a little girl, but sometimes a boy or a man, and used as a toy. The word doll is of doubtful derivation; possibly from *idol*. The use of dolls dates from the most remote times, and is common in all countries, barbarous as well as civilized. The love of dolls is a perfectly legitimate feeling, and its exercise helps to cultivate not only tender affections, but also taste as regards the making and management of children's dresses. Accordingly, the keeping of dolls becomes a part of the home education of girls, and is recognized to be so by the universality of the practice. Dolls were at one time imported chiefly from the Netherlands, and hence not an unusual name for a doll was "Flanders baby." These old Flemish or Dutch dolls were made of wood, with neatly-formed faces and flashy dresses, the cheaper kinds having slender wooden legs. Latterly, there have been great improvements in the making of dolls, and it has assumed the character of a manufacture; but there are still large importations from the countries on the Rhine, France and Switzerland. The discovery and perfection of the phonograph marks a new era in the manufacture of these toys, and talking dolls are now almost as common as the ordinary wax dolls were a few years ago.

DÖLLINGER, JOHANN JOSEPH IGNAZ VON, a German theologian, born in 1799. He received holy orders at Würzburg, and for a time was engaged in parochial duties in his native diocese; but later was appointed a professor at Aschaffenburg. In 1826 he accepted the chair of ecclesiastical history in the University of Munich, and in 1871 became rector. In 1873 he was appointed president of the Royal Academy of Science at Munich. He is the author of numerous works on ecclesiastical history.

DOLLY SHOP, the name popularly given in London to a shop in which rags and other old articles are bought, and over whose door a black doll is usually suspended. It is understood that dolly shops are in many instances unlicensed pawnbroking concerns. For small articles, a few pence are given with the understanding that the seller can buy them back at an advance some days after. In Edinburgh and Glasgow, shops of this kind are known as *wee pawnies*, and give some concern to magistrates and police.

DOM, or DON, a title originally assumed by the popes, from whom it descended in France, at least, to bishops and other dignitaries, and finally to monks. In Portugal, the title *dom* is confined to the sovereign and his family. The Spanish *don* was originally confined to the nobility, but is now bestowed by courtesy as indiscriminately as the English Mr. or gentleman. The feminine *doña*, is, in like manner, given to ladies.

DOMBEY, JOSEPH (1742-94), a French botanist. In 1776 he was appointed botanist of the Jardin des Plantes. In 1777 he was sent to South America to collect such useful plants as could be cultivated in France. The specimens that he gathered were captured by the British and sent to the British museum, where they still remain. His second shipment was confiscated by the Callao authorities. In 1782 he visited Chili. During his stay the cholera broke out and he was appointed physician-in-chief of Concepcion. In 1785 he returned to France. Eight years later he was sent on a mission to the United States, but was captured by privateers and imprisoned in Montserrat, where he died.



**DOMESTIC ARCHITECTURE.** The external forms and internal arrangements of the domestic abodes of a people are far more influenced by their manners, habits, and occupations, and by the climate in which they live, than their ecclesiastical edifices and public buildings, and there is, consequently, no department of architecture which is so varied and national as domestic architecture. But not only are the circumstances of each country different in this respect, the same is the case with every department in each country, with every town in each department, with every street in each town; and a domestic architecture which fulfills its object will not only adopt itself to the necessities, but will also make the best, in point of artistic effect, of the specialties of every case with which it is called upon to deal. The circumstances of families, and even the tastes and fancies of individuals, are legitimate subjects of consideration in domestic architecture.

**DOMINO**, the name formerly given to the garb worn in winter by priests while officiating in cold edifices. It is now used to signify a masquerade costume, consisting of an ample cloak or mantle with wide sleeves.

**DOMINOS**, the name of a game, usually played with 28 oblong, flat pieces of ivory or bone, etc., each of which bears two numbers marked by points from naught to six. The attempt has been made to trace the game of dominos back to the Greeks and Hebrews, and also to the Chinese. It is certain that it was introduced about the beginning of the 18th century from Italy into France, where it immediately became popular in the larger towns.

**DOMINUS**, the Latin word which we commonly render lord, but which more properly signifies master, as opposed to the slave (*servus*). Aurelianus is said to have been the first emperor who adopted *dominus* as a title of honor on his medals, though it had long been made use of in conversation and in correspondence in that sense. In legal phraseology, the *dominus litis* is the person really interested in the issue of an action, though not necessarily the pursuer.

**DOM PEDRO**, late Emperor of Brazil, died in Paris Dec. 4, 1891, aged 66. He was a man of active mind, highly educated, a friend of progress, and in many ways an ideal ruler; politically, however, he was not a skilled leader; his overthrow in 1889 was carried out without a serious contest, and he submitted to the situation as the simplest way of keeping the country from civil war. The abolition of slavery, secured by a law passed in 1871, providing for doing away with it gradually, will remain the most important event of Dom Pedro's reign and stamp him as one of the most enlightened and progressive monarchs of the century.

**DONALDSON, JAMES LOWRY** (1814-85), a United States soldier. He entered the army in 1836, and served in the Florida war, the Mexican war, and the civil war. He attained the rank of colonel on the staff, and received the brevet of major-general of volunteers. He published *Sergeant Atkins*.

**DONALDSON'S HOSPITAL**, an extensive establishment at Edinburgh, of the character of Christ's Hospital, London. Its founder was James Donaldson, a successful printer in Edinburgh.

**DONALDSONVILLE**, a railroad and river town of Louisiana, formerly the capital of the State, and now the capital of Ascension parish. It is situated on the Mississippi River, 64 miles above New Orleans, and at the head of Bayou Lafourche. The town has excellent advantages for trade.

**DONATUS**, *ELIUS*, a well-known grammarian and commentator, who taught at Rome about A. D. 355,

and was the instructor of St. Jerome. He wrote treatises: *De Literis, Syllabis, Pedibus et Tonis, De Octo Partibus Orationis* and *De Barbarismo, Solecismo* etc. The writings form together a very complete course of Latin grammar, and in the Middle Ages were the only text-books used in the schools, so that *Donat* came in the West of Europe to be synonymous with the grammar or with the elements of any science. *The Donat into Religion*, is the title of a book by an English bishop. The Latin grammar of Donatus has formed the ground-work of the elementary treatises on that subject to the present day. Donatus' was one of the first books on which the art of printing by means of letters cut on wooden blocks was tried, and copies of these are reckoned among the greatest of bibliographical curiosities.

**DONDRA HEAD**, the most southern extremity of Ceylon. As compared with Cape Comorin, the corresponding point in the peninsula of Hindoostan, it more directly faces the Indian Ocean, and lies nearer the grand thoroughfares of Eastern commerce. An adjacent village of the same name numbers 900 inhabitants.

**DONELSON, ANDREW JACKSON** (1800-71), an American politician. From 1820 to 1822 he served in the army, but resigned, and was admitted to the bar in 1823. He was private secretary to President Jackson during his two terms, and in 1844 was appointed chargé d'affaires to the republic of Texas. In 1846 he became minister to Prussia, and in 1848 to the federal government of Germany. He was the nominee for vice-president on the ticket with Millard Fillmore in 1856, and after his defeat in the election, retired from public life. Subsequently he practiced law in Memphis.

**DONGAN, THOMAS** (1634-1715), a colonial governor of New York. At an early age he entered the British army, and later the French army. Subsequently he was made lieutenant-governor of Tangiers, and in 1682 became governor of the colony of New York. He resigned in 1688 and returned to England three years later.

**DONIPHAN, ALEXANDER WILLIAM** (1808-87), an American soldier. He began the practice of law at Lexington, Mo., in 1830. In 1838 he had risen to brigadier-general in the State militia, and in 1846 he entered the United States service as a colonel, taking part in various important battles of the Mexican war. In 1836, 1840, and 1854 he was a member of the Missouri State legislature.

**DONGARPUR**, a fortified town of Rajputana, in Central India. It is the capital of a protected state of the same name, containing 1,000 square miles, and 100,000 inhabitants.

**DONG-NAI**, the name of a river and a town in Anam or Cochinchina.

**DONIPHAN**, a village and grain-shipping point of Doniphan county, Kan., on the Missouri River, six miles northeast of Atchison.

**DONOVAN, DENNIS D.**, a lawyer, born in Henry county, Ohio, Jan. 31, 1859. He received a common school education and was a teacher for three years, and was postmaster of Deshler, Ohio, during President Cleveland's administration. In politics he was a Democrat; was twice elected a member of the Ohio State legislature, and in 1890 was elected a representative from the Sixth Congressional District of Ohio to the 52d Congress.

**DONNER LAKE**, a small mountain lake of Nevada county, Cal., in a chasm of the Sierra Nevada, 13 miles northwest of Lake Tahoe. It is a summer resort, and derives its name from a man named Donner, who led a band of emigrants in 1846, most of whom perished of starvation on the shores of this lake.

**DOO, GEORGE THOMAS**, one of the best English historical engravers of the present day, born in the parish of Christ Church, Surrey, in 1800. His admirable rendering of Eastlake's *Italian Pilgrims Coming in Sight of Rome*; his exquisitely finished heads of women and children, after Lawrence; his engravings from Raphael, Corregio, and others have succeeded in winning for him a very high place in the estimation of the admirers of his laborious art. In 1851 he was elected a fellow of the Royal Society, and in 1856, a royal academician. He died in 1886.

**DOOLITTLE, JAMES ROOD**, an American Senator, born in 1815. He began the practice of law in 1837, and became district attorney of Wyoming county, N. Y., in 1845. In 1853 he was made judge of the first judicial circuit of Wisconsin, and from 1857 to 1869 served as a United States Senator. He retired from public life in 1869, and has since practiced his profession in Chicago, Ill.

**DOOM**, the old name given to the last judgment, and to those representations of it in churches which have a religious rather than an artistic object. Many of the dooms are executed in distemper. In the reign of Edward VI most of them were washed over or otherwise obliterated as superstitions. There is a fine one still remaining in the Church of the Holy Trinity at Coventry, England.

**DOON**, a Scotch river rising in the southeast of Ayrshire, in Loch Enoch; runs northwest through Loch Doon, past Dalmellington, Burns's Monument, and Alloway Kirk, to the Firth of Clyde. It is 30 miles long.

**DOOR AND DOORWAY**. In art, the form of the door is determined by the architectural style of the building in which it is placed. In classical buildings it is generally rectangular in form, though both Greeks and Romans, following the Egyptians, among whom the practice was almost universal, occasionally diminished the opening toward the top, and the Romans in later times very frequently threw over it the circular arch, which was the characteristic feature of their style. Egyptian doors are known to us, for the most part, only by the examples which remain in monumental structures, and these, like the other members of the style thus exhibited, are of gigantic proportions. The door of the temple at Edfu measures seventy-four feet to its summit.

With the Egyptians the door was an architectural object of very great importance. On either side colossal statues or obelisks were placed, and the approach to it was often lined with rows of gigantic sphinxes. The Greek door was surrounded by moldings, and as the lintel or top stone which covered it projected on both sides beyond the jambs, the moldings which ran round both sides, jutted out at the place of meeting forming a sort of shoulder. This arrangement, however, was by no means uniform, the moldings of the jambs being often quite separated from those of the architrave, as the beautiful door of the Erechtheum. The doors themselves, in antiquity, in private dwellings were usually of wood; and in structures devoted to religious or public purposes of metal, and occasionally of marble. They were generally paneled and turned on pivots working in sockets. With the exception of the forms of the windows and the tracery and foliage of the pillars, doors are the most characteristic features of all the styles of Gothic architecture.

**DOORGA**, or **DURGA**, a Hindoo divinity, one of the names given to Paravati, the consort of Siva. She is the Amazonian champion and protectress of the gods, and has been compared to the Olympian Juno, and the Pallas or armed Minerva of the Greeks. She is represented with ten arms. In one

hand she holds a spear, with which she is piercing the giant Muhisha; in another, a sword; in a third, the hair of the giant, and the tail of the serpent turned around him; and in others, the trident, discus, ax, club, and shield.

**DORAK**, a thriving manufacturing town in the province of Khuzistan, Persia. By a canal uniting the river Dorak with the river Karun, considerable trade is carried on. Population, 8,000.

**DORAN, JOHN**, an English author, born in 1807. He was for years a tutor in a private family and then traveled extensively. On his return to England he took up his residence in London, and devoted himself entirely to literature. He has contributed to many periodicals, and written works on miscellaneous topics. He died in 1878.

**DORÉ, PAUL GUSTAVE**, a French artist, born at Strasburg, in 1832, died in 1888. He was educated at Paris, and early displayed superior talent. He first contributed sketches to the "Journal pour Rire," and other Paris periodicals, and in 1855 his picture of the *Battle of the Alma* was exhibited, and in 1857 followed the *Battle of Inkerman*. Besides executing a mass of miscellaneous works he illustrated Tennyson's works, Coleridge's *Ancient Mariner*, the *Legend of the Wandering Jew*, and the Bible, and also reproduced and exhibited in Paris and London many of his designs. The Doré Gallery, used for this purpose, has been open in London for several years. *Christ Leaving the Praetorium* is his most important painting. The slightest of Doré's productions shows that he was an artist and poet, and excites a greater interest than many works less characterized by hastiness and mannerism. Doré received the decoration of the Legion of Honor in 1861.

**DORN, JOHANN ALBRECHT BERNHARD** (1805-81), a German Orientalist. In 1829 he was appointed ordinary professor of Oriental languages at the Russian University of Charkow, and in 1845 became professor of history and Asiatic geography at the Oriental Institute at St. Petersburg. In 1843 he was made keeper of the Imperial Library and director of the Asiatic Museum. He has published many translations of Oriental works on history and geography, and also a valuable book as the result of a scientific journey to the Caucasus, entitled: *Caspia Invasion of the Ancient Russians in Tabaristan*.

**DORNER, ISAAK AUGUST, D.D.**, a Protestant theologian, born at Württemberg in 1809. He wrote many able works, among them the *History of the Development of the Doctrine of the Person of Christ*. In 1873 he was a delegate to the meeting of the Evangelical Alliance. He died in 1884.

**DORNIC, DORNIC, or DORNOCK**, a species of figured linen, deriving its name from Dornich, or Tournay, in the Netherlands, where it was formerly made in considerable quantity.

**DORR, BENJAMIN** (1796-1869), an American P. E. clergyman. He was ordained priest in 1823, and was rector of different churches to 1835. From 1835 to 1837 he was general agent of the domestic committee of the Board of Missions, and from 1837 to his death was rector of Christ Church, Philadelphia. He was the author of many books on religious topics.

**DORR, THOMAS WILSON** (1805-54), an American politician. He began the practice of law in Providence, R. I., and was a member of the assembly from 1833 to 1837. In 1842 he was elected governor of the State by what was known as the "suffrage party," with Samuel W. King as the choice of the supporters of the old charter. King's election finally prevailed, and Dorr was sentenced in 1844



to imprisonment for life on a charge of high treason. He was released, however, in 1847, and restored to civil rights in 1851.

DORSHEIMER, WILLIAM (1832-88), an American lawyer and journalist. From 1867 to 1871 he was district attorney for the northern district of the State of New York, and lieutenant-governor from 1875 to 1880. In 1883 he became a member of Congress, and in 1885 received the appointment of United States district attorney for the southern district of New York. The same year he became editor of "The New York Star."

DORT, SYNOD OF, a synod of the Dutch national church, convened at Dort from November, 1618, to May, 1619, for the preparation of canons setting forth the Calvinistic doctrines, and for the publication of an ecclesiastical censure against the Remonstrants, also for calling upon the civil power to enforce the decrees of the synod by banishment, imprisonment, or fines.

DORTURE (old Eng., *dorter*; Fr., *dortoir*), a long room in a convent, divided into a succession of small chambers, or cells, where the inmates sleep. It usually has immediate access to the church or chapel, for the convenience of attendance on services during the night.

DORY (nautical), a small boat of simple construction, flat-bottomed, and much used in fisheries as a go-between from the larger boat and the shore, in loading and unloading. It is also used to go in from the larger vessel in catching fish.

DOTIS, or TOTIS, a town in the northwest of Hungary, district of Komorn. It contains a splendid chateau, the property of the Esterhazy family, whose adjoining gardens are laid out in the English fashion. Population, 9,855.

DOTTED NOTE, in music, a note followed by a dot to denote an increase of length equal to one-half its simple value. Thus, a dotted semibreve is equal to three minims, and a dotted quarter to three eighth notes. *Dotted rest* is a rest lengthened by a dot in the same manner as a dotted note. Notes and rests are sometimes followed by two dots, indicating an increase of length equal to three-quarters of their simple or primary value, and are then said to be *double-dotted*.

DOTEREL (*Charadrius morinellus*), a species of plover inhabiting Northern Europe and Asia in summer, breeding chiefly in the highest latitudes. On the approach of winter, it migrates to the countries around the Mediterranean, and to others of similar climate. See KILLDEER, *Britannica*, Vol. XIV, p. 76.

DOUAY BIBLE, THE, a version of the Holy Scriptures (Old Testament), the authorized version of the Roman Catholic Church. It was made at Douay in 1609-10. The authorized version of the New Testament was made at Rheims in 1582.

DOUAY, CHARLES ABEL, a French general, born in 1809, killed at the battle of Wiessenburg in the Franco-German war in 1870. He served in Algeria, in the Crimean war, and in Italy in 1859.

DOUBLE CONSCIOUSNESS. Double or divided consciousness has likewise been designated double personality. The term comprehends a group of morbid mental conditions involving some modification in the clearness of the idea of personal identity. Individuals are often encountered with confused notions of the "me" and "not me;" others conceive that parts or properties of their frame belong to another person, or that they are inhabited and ruled by a spirit or entity acting in opposition to their will and interests; and there are others, who, at different times and under different circumstances, such as when influenced by or free from

moral or physical stimulation, conceive that they are different persons, and endowed with different qualities and powers. These manifestations, however, do not fully illustrate the state under consideration, which has been described as exhibiting, in some measure, two separate and independent trains of thought and independent mental capabilities in the same individual, each train of thought and each capability being wholly dis severed from the other, and the two states in which they respectively predominate, subject to frequent interchanges and alternations.

DOUBLE SHOTTING, an augmentation of the destructive power of ordnance, by doubling the shot fired off at one time from a gun. Sometimes three shots are fired at once, in which case the piece is said to be "treble-shotted."

DOUBLING THE CUBE, a celebrated geometrical problem among the ancients. The object was to find the side of a cube whose contents should be twice that of another given cube; and various accounts are given of how the problem was suggested.

DOUBLING GAP SPRINGS, a health resort of Cumberland county, Pa., 30 miles west of Harrisburg. Many chronic diseases are cured by the use of water from these springs. Some of the springs are saline-sulphuric and others are carbonated saline chalybeate.

DOUBLOON (Sp., *dublone*, double), the name of a gold piece coined in Spain and Spanish America. The Dublon de Isabella, coined since 1848, is of one hundred reals, and equivalent to 25.84 French francs. The older Spanish doubloons vary in value from 85 to 81 francs.

DOUGLAS, GENERAL SIR HOWARD (1776-1861), Baronet, G. C. B., son of Admiral Sir C. Douglas. Entering the army when young, he served in Spain and Portugal. He was governor of New Brunswick, lord high commissioner of the Ionian Islands, and from 1842 to 1847 he was member of Parliament for Liverpool. In 1851 he became a general in the army. He disapproved of the method of warfare in the Crimea in 1855, declaring that Sebastopol could not be reduced unless by a change in the plan of operations, such as he traced; and his prophecy was verified by the event.

DOUGLAS, JOHN, D. D. (1721-1807), the son of a respectable shop-keeper in his native town. In 1736 he entered St. Mary's College at Oxford, where, after five years' study, he took his bachelor's degree. His life is little more than a chronicle of his very numerous preferments, which ended in his being translated to the see of Salisbury in 1791.

DOUGLASS, FREDERICK, an American orator, born in Maryland in 1817. His mother was a negro and his father a white man. He was at one time a slave, but in 1838 fled to Massachusetts. From 1841 to 1845 he traveled and lectured through the New England States as the agent of the Massachusetts anti-slavery society. In 1845 he went to Europe, where he lectured in the large towns of England, Ireland, Scotland and Wales. During the war he was active in enlisting men to fill colored regiments. From 1847 to 1870 he edited the weekly journal, "The North Star," and in 1870 became the editor of the "New National Era" in Washington. In 1871 he was assistant secretary to the commission to the Dominican Republic; and was afterwards a member of the territorial council of the District of Columbia. In 1872 he was a presidential elector for the State of New York. In 1876 he was United States marshal for the District of Columbia, and was subsequently recorder of deeds for the District. In 1886 he visited Great Britain, where he met with an enthusiastic reception. At the

present writing, 1891, he is minister resident and consul-general to Hayti, and chargé d'affaires to Santo Domingo.

DOVE, In Christian art, the dove is employed as an emblem of the Holy Ghost, no doubt from the fact of this being the form in which the Spirit descended upon our Lord at his baptism. From the dove being used to symbolize purity, it is generally represented white, with its beak and claws red, as they occur in nature. In the older pictures a golden nimbus surrounds its head; the nimbus being frequently divided by a cross, either red or black. In stained-glass windows we see the dove with seven rays proceeding from it, terminating in seven stars, significative of the seven gifts of the Holy Spirit. Holding an olive branch, the dove is an emblem of peace. When seen issuing from the lips of dying saints and martyrs, it represents the human soul.

DOVE, LEINRICH WILHELM (1803-79), a German physicist. In 1828 he became assistant professor of natural philosophy at Königsburg, and in 1829 at Berlin. He was made full professor in 1845. He is credited with many important discoveries; he wrote several valuable works on physics. See *Britannica*, Vol. I, p. 109.

DOVE, RICHARD WILHELM, an eminent German jurist, born in Berlin in 1833. He became privat-docent of the University of Berlin in 1859, professor of the University of Tübingen in 1862, and was elected to the German Reichsrath in 1871. In 1860 he began the publication of the "Zeitschrift für Kirchenrecht," a leading periodical in Europe on all questions of church law.

DOVER, capital of Delaware, and county-seat of Kent county, situated five miles west of Delaware Bay. It contains a State House, seven churches, newspaper offices, several educational institutions, two banks, a flour-mill, several fruit-packing and evaporating houses, a glass factory, a foundry, sash and fruit-crate factory, a carriage manufactory, gas-works, and a Mount Holly system of water-works. The city is the center of an extensive fruit-growing region.

DOVER, a village of La Fayette county, Mo., on the Missouri River, 14 miles below Lexington. The place contains a brewery and flouring-mills, and hemp is raised in the vicinity.

DOVER, a city of New Hampshire, and county-seat of Strafford county (see *Britannica*, Vol. VII, p. 381). Dover is the oldest town in the State, having been settled in 1623. It is abundantly supplied with water-power from the Cochecho River, which has here a direct fall of 32 feet. The site of the city is hilly or uneven, and many of the streets cross each other obliquely. It is, however, advantageously situated for manufacturing purposes, and has several immense cotton mills and print-works. It has also manufactories of woollen goods, boots and shoes, carriages, iron foundries, etc. The growth of the city has been comparatively slow, the population in 1880 being 11,684, and in 1890, 12,790.

DOVER, a town of Morris county, N. J., on the Rockaway River and Morris Canal. It manufactures iron, having several forges, foundries, steel-works, rolling-mills and spike-factories.

DOVER, county-seat of Stewart county, Tenn., on the Cumberland River, one mile east of Fort Donelson. A national cemetery is located a short distance west of the village.

DOVER'S POWDER, a preparation of powder of ipecacuanha one dram, opium in powder one dram, and sulphate of potash one ounce. The whole is thoroughly mixed, and the ordinary dose is from five to ten grains. Occasionally, saltpeter is added. It is a most valuable medicine, and acts as a sudorific, increasing the proportion of sweat

or sensible perspiration. In feverish conditions where there is the dry, furred tongue, and the dry skin, and the brain out of order, Dover's Powder is considered injurious; but when the tongue is moist, the skin moist and soft, and the brain comparatively unaffected, this powder is of great service.

DOW, NEAL, temperance reformer, born in Portland, Me., March 20, 1804. He was educated at the Friends' Academy in New Bedford, Mass. He was elected mayor of Portland in 1851 and was reelected in 1854. Mr. Dow became a champion of prohibition, and it was through his efforts that the Maine liquor law was passed in 1851. He was a member of the State legislature in 1858-59. At the commencement of the civil war he was appointed colonel of the 13th Maine volunteers, and accompanied Gen. Butler's expedition to New Orleans. In 1862 he was commissioned a brigadier-general of volunteers and placed in command of the forts at the mouth of the Mississippi, and later of the district of Florida. Wounded and taken prisoner in the attack on Port Hudson in May, 1863, he was exchanged after eight months' imprisonment, and resigned in the following year. He has since devoted himself to the temperance cause in the United States, Canada and Great Britain, and in 1880 was prohibition candidate for President of the United States.

DOWAGER (Fr., *donairière*, from *donaire*, dowry, dower, derived from the Gr. and Lat. *dos*, a thing given, verb *do*, to give), a widow with a dower; but commonly the title is applied only to the widows of persons of high rank.

DOWAGIAC, a city of Cass county, Mich., on the Dowagiac River, 105 miles east of Chicago.

DOWDEN, EDWARD, an Irish poet, born in 1843. In 1867 he became professor of oratory and English literature in Trinity College, Dublin. He has written numerous criticisms and poems.

DOWELS join two pieces of material horizontally in a building or other structure.

DOWER, "in the common law, is taken from that portion of lands or tenements which the wife hath for terme of her life of the lands or tenements of her husband after his decease, for the sustenance of herself, and the nurture and education of her children."—*Coke Upon Litt.*—30b. The common-law rights of the wife were greatly modified by the English Dower act of 1833. In some of the States of the United States, the dower is a share in fee; in others it extends only to such property as was held by the husband at the time of his death.

DOWLAS, a kind of coarse, strong linen, used by working people for shirts, and manufactured largely at Knaresborough, Yorkshire, Eng., at Dundee, and at Newburgh and other places in Fifeshire, Scotland.

DOWNIEVILLE, the county-seat of Sierra county, Cal., on the Yuba River, surrounded by high mountains. In the vicinity are deep gravel, hydraulic placer and quartz mines.

DOWNING, ANDREW JACKSON (1815-52), an American horticulturist. His entire life was spent in the study of horticulture, and in 1851 he was commissioned to lay out and plant the public grounds of the Capitol, White House and Smithsonian buildings. He wrote many valuable works on horticulture. Mr. Downing was one of the victims of the *Henry Clay* disaster on the Hudson River, N. Y., in 1852.

DOWNTOWN, a railroad junction of Chester county, Pa., 32 miles west of Philadelphia. It has two academies, water-works, a limestone quarry, and manufactures shoes and carriages.



**DOWNS** (Ger., *dünen*, Fr., *dunes*, from the root *tan*, common to the Gothic and Celtic languages, signifying a hill), a term usually applied to hillocks of sand thrown up by the sea or the wind along the sea-coast. It is also a general name for any undulating tract of upland which is too light for cultivation, and is covered with short grass. It is specially applied to two broad ridges of undulating hills south of the Thames, beginning in the middle of Hampshire, and running east, the North Downs, through the middle of Surrey and Kent to Dover (about 120 miles), and the South Downs, through the southeast of Hampshire and near the Sussex coast to Beachy Head (about 80 miles). Between the two ranges, lies the valley of the Weald, from which the chalk strata are supposed to have been removed by denudation. Toward the Weald the descent from both Downs is rapid, and presents cliffs of sea-margin, while the opposite slopes are gradual. See Britannica, Vol. I, p. 723.

**DOYLE, RICHARD** (1826-83), an English artist. He first gained a reputation by making designs for various periodicals, but later became widely known as a book illustrator. Doyle's most important independent publications are: *The Continental Tour of Messrs. Brown, Jones and Robinson*; and a Christmas book, entitled *In Fairy-Land; Pictures of the Elf-World*.

**DOYLESTOWN**, the county-seat of Bucks county, Pa., 25 miles north of Philadelphia. It has two private academies, a public library, gas-works, water-works, and is a pleasant resort for summer visitors.

**DOZY, REINHART**, born in 1820, one of the most learned Orientalists of the present day.

**DRACHENFELS** ("Dragon's Rock"), a mountain, 1,055 feet high, on the Rhine, eight miles southeast of Bonn. It is of volcanic origin, consisting of lava, trachyte, and basalt. The cave where the dragon—from which the mountain takes its name—was wont to abide is pointed out to the traveler. The ruins of an old castle crown the summit, and adds picturesqueness to the Drachenfels.

**DRACHMANN, HOLGAR HENRIK HERHOLDT**, a Danish poet, novelist and painter, born in 1848. Since 1870 he has devoted himself almost entirely to literature, though he has occasionally painted a landscape or marine view. He has written many poems and novels, and ranks among the most popular Danish writers.

**DRACO**, a constellation in the Northern hemisphere. The star Draconis is celebrated as the one used in determining the coefficient of aberration of the fixed stars.

**DRAFT**, a tentative copy of a legal document or other formal writing, made for the purpose of adjusting the matter afterward to be admitted into the fair copy, or engrossed, as it is called. Manuscripts and proof-sheets are the drafts of printed works.

**DRAG-BAR**, a bar or link for attaching carriages together, or to the motive power, as on railways.

**DRAGONET** (*Callionymus*. See Britannica, Vol. XII, p. 690), a genus of fishes of the Goby family (see Britannica, Vol. X, p. 714), remarkable for having the gill-openings reduced to a small hole on each side of the nape, and the ventral fins placed under the throat, separate, and larger than the pectorals. They have no air-bladder. The species are pretty numerous; most of them finely colored, as the Gemmæus Dragonet (*Callionymus lyra*) of the British coasts—called *Gowdie* (goud, gold) in Scotland—a fish about ten or twelve inches long,

the prevailing yellow color of which is varied with spots of sapphire blue, etc.

**DRAGON, GREEN** (*Dracunculus vulgaris*), a plant of the natural order *Araceæ*, which receives its name from the spotted stem. It is a native of Southern Europe. Its flowers are black, remarkably fetid, and give out exhalations which cause headache, giddiness and vomiting. The root is emetic, and, probably for no better reason than the peculiar appearance of the stem, has been supposed useful for curing serpent-bites.

**DRAGON ROOT** (*Arisema triphyllum*, formerly *Arum triphyllum*), a plant of the natural order *Araceæ*, a native of North America, whose tuber is a powerful local irritant, and is used as a stimulant of the secretions in chronic bronchitis, asthma, rheumatism, etc. The powder, made into a paste with honey, is beneficially applied to the mouths and throats of children in aphthæ; and milk in which the root has been boiled is a useful ointment in cases of scald-head, ringworm, etc.

**DRAGON'S MOUTH**, or in Spanish, *Boca del Drago*, the name of two straits or passages in the New World. One of them is in South America, separating Trinidad from the mainland, and connecting the Gulf of Paria with the southeast extremity of the Caribbean Sea. The other is in Central America, being on the northeast coast of Veragua, the most northwest portion of New Granada, between the Caribbean Sea and Lake Chiriqui.

**DRAGOON BIRD**, a Brazilian bird having a large cap-like bunch of feathers above its bill.

**DRAKE, DANIEL** (1785-1852), an American physician. He studied medicine, and settled in Cincinnati, where he soon gained a large practice. In 1816 he became professor in the medical department of the Transylvania University, Ky., and afterwards occupied a similar position in various other colleges. He was the author of numerous medical works.

**DRAKE, SAMUEL GARDNER** (1798-1875), an American antiquarian. In 1828 he established in Boston, Mass., the first antiquarian book-store in the United States. In 1858 he was president of the New England Historic Genealogical Society, and for many years editor of its quarterly "Register." He has written many valuable books on historical subjects.

**DRAKE UNIVERSITY** is most fortunately located upon a beautifully wooded campus of 13 acres in the northwestern part of the city of Des Moines, Iowa. It was founded in 1881 through the foresight and enterprise of its present chancellor, G. T. Carpenter, A. M., LL.D., Elder D. R. Lucas and others, and named in honor of Gen. F. M. Drake of Centerville, its most munificent benefactor. It has good buildings, apparatus, libraries, and museums. At present the University consists of eight colleges or departments, viz: Collegiate, law, medical, theological, normal, business, musical and art. While non-sectarian, it is under the general control of the Church of Christ or Disciples. Its catalogue for 1900 shows an enrollment of 827 students, 44 graduates, and 56 instructors.

**DRAMA, THE AMERICAN.** The first theatrical performances in North America were given in Quebec in 1694, by amateur players, although there is little doubt that the Spaniards in Mexico had established the stage, which in the times of the Spanish invasions was in the height of its glory in the mother country. The next positive date was 1745, when the first English performances were given in the island of Jamaica, and so successfully that the leader, Moody, famous as an actor of Irish characters, went to England, and in the following

year brought out a regular company of actors, returning to Jamaica, where he remained for many months.

The first performance of an English play in what is now the United States was in Boston in 1749, when Otway's *Orphan* was acted, but received by the Puritans with such horror that at the next general court a law was passed fining actors as well as spectators \$5 (\$25) apiece, and the owner of a building \$20 (\$100), "for each and every day or time" a play was attempted or permitted. This law was enforced for nearly fifty years. In 1749 an attempt was also made to open a theater in Philadelphia, but the parties were arrested and bound over to their good behavior. They went to New York, and in February 1750, rented a convenient room on Nassau street, where they opened on the fifth of March following with a play announced as *The Historical Tragedy of King Richard III.* "Wrote originally by Shakespeare and altered by Colley Cibber, esq." The season lasted sixteen months with the exception of six weeks in the summer of 1750. The managers and chief actors were Murray and Kean. In July, 1750, the company disbanded, but the remains were gathered together by a Mr. Upton. The following season does not seem to have been very successful, as it was brought to a close in February, 1751.

Moody's success in Jamaica caused him to return to England in 1749, when he was at once engaged by David Garrick for Drury Lane. The rumors of his exploits had spread in London, and caused Mr. and Mrs. Lewis Hallam to organize a company, and with a stock of scenery and costumes from the Goodman Fields Theater, they came to America, went to Williamsburg, then the capital of Virginia, altered an old store house over into a theater, and opened it Sept. 6, 1752, with the *Merchant of Venice* and Garrick's farce *Leatherstocking*. The reception they received was very different from that accorded their friends in Boston and Philadelphia. Governor Dinwiddie gave them a certificate drawn up and signed in council, testifying in high terms as to their ability as comedians, as well as to their conduct, as men. They went to Annapolis, Md., and acted in the first regular theater erected in the colonies. In June, 1753, they went to New York, but met with unexpected opposition through the abuse of a trust reposed in their advance agent. Mr. Hallam pleaded his case in the public press, and appealed to the authorities, with ultimate success. A prosperous season of six months followed, when they went to Philadelphia, where they met the most determined opposition. Petitions and counter-petitions were signed and the city was divided in the dispute. Permission was at last obtained for the presentation of twenty-four plays on the condition that the players "offered nothing indecent or immoral." The season was so satisfactory and successful that six more nights were added. Mr. Hallam then went to the West Indies, where he died. A Mr. Douglass led the actors back to New York, and built a theater on Cruger's wharf, the Nassau Street Theater having been converted into a church.

In the spring of 1759, Mr. Douglass went to Philadelphia, where he built the first regular theater erected in that city. Shortly after, a theater was built in Newport, R. I., where the first performance by professional actors was given in the New England States, on Sept. 7, 1762. The company went to Providence, and in that year was formed the first theatrical circuit. It began at Williamsburg, Va., and included Annapolis, Philadelphia, New York, Newport, Providence, and a few smaller places where a court-house or proper building might serve the purpose of a theater. In New York a new theater was built in Chapel street, and was, during one of the disturbances caused by the Stamp Act, the scene of the first theatrical riot. During the succeeding ten years several other theaters were built, but on Oct. 24, 1774, the Continental Congress recommended a suspension of all public amusements. Douglass, who had been fairly successful, was obliged to yield, and took his company to the West Indies, where he had been always welcome.

During the Revolutionary struggle, there were no theatricals except those given by British officers. A remarkable incident brought these to an end. Burgoyne, the British commander, wrote a play, *The Blockade of Boston*, and while it was being played, a sergeant dashed in and announced, "The rebels have attacked the lines on the Neck" (the Neck was a strip of land connecting Boston with the mainland). The audience applauded his spirited delivery, and it was some minutes before the truth of his statement was realized. The play ended without completion; the British were driven from Boston, and went to New York, where they took possession of the John Street Theater, which they called the Theater Royal. Major André was among the chief actors.

After the war, the players came back. Up to 1794 there was in the States but one stock company of recognized merit. After this date the growth of the drama was marked for its rapid development. Owing to prejudice, which had not yet subsided, various efforts to avoid the rigid laws were adopted. As late as 1792 a playbill announced "A Moral Lecture in Five Parts, in which the Dreadful Effects of Conspiracy will be Exemplified." It was but an underhand way of advertising Otway's *Venice Preserved*, *Hamlet* and *Romeo and Juliet* were also given as "moral lectures" or "moral dialogues." Such a violation of the law could not last long, and in December, 1792, the "exhibition rooms" were closed. Fortunately, in 1793, the legislature of Massachusetts repealed the law against theaters, and in February, 1794, the Federal Street Theater was opened with a prologue by Robert Treat Payne, Jr.

In New Orleans, the first performances seem to have been given in 1791 by a company who had escaped from the insurrectionary troubles in St. Domingo. The first theater in the Crescent City seems to have been built about 1808, and in 1822 the first American theater in New Orleans was built. A brick theater was built in Natchez, Miss., in 1828. From the beginning of the century the drama prospered, and kept pace with the growth of the country.

The first play written and acted in America seems to have been Burgoyne's *Blockade of Boston*, already referred to. The first professional dramatist in the United States was William Dunlap, one of the most fertile of playwrights. He was one of the founders of the National Academy of Design, and the author of several works. His *History of the American Theater* is an invaluable authority.

John D. Burck, killed in a duel in 1808, was the successful author of the plays *Bunker Hill*, or *the Death of General Warren*, *Joan of Arc*, and several others. Other actors and authors followed, among them John Howard Payne, the author of *Home, Sweet Home*. He is credited with some sixteen plays. Samuel Woodworth, the author of *The Old Oaken Bucket*, was also the writer of successful plays. George P. Morris, the author of *Woodman, Spare That Tree*, produced *Briercliff*, which held the stage for years.

The first actor "star" was Cooper. He attached himself to no company, but went from one theatrical to another, playing the chief part. The first great actor to follow him was George Frederick Cooke, who died in 1812. In 1820, Edmund Kean appeared as Richard III in New York. After filling his New York engagement he went to Boston; but, one night, there being a sparse audience, he refused to act, and left the country. Five years later he returned and appeared in New York, but the memory of his slight to the Boston audience was not dim, and one of the worst riots known in theatrical history was the result. Kean apologized, and filled his engagement, but when he went to Boston another riot occurred, which resulted in the destruction of the greater part of the theater.

In 1821 Junius Brutus Booth appeared as Richard III in Richmond, Va., then went to New York. He was immediately acknowledged as a master, and no actor exerted so much influence on acting in America as he. He died in 1826, four days after he had played in New Orleans, and while on his way to Cincinnati. Edwin Forrest was, if not the equal of Booth, at least a fit successor. He began playing in 1820, when but fourteen years of age. At nineteen he was the leading actor at the Albany Theater, and at the age of twenty made his appearance at the New York Park. In 1845, while in England, he became involved in a trouble with Macready, which culminated in a riot in New York in 1849, when the militia were called out, and, firing into the crowd, left 22 dead and 36 wounded on the pavement. At his death Forrest left his fortune to found a home for the needy members of his profession.

Macready, although thirteen years older than Forrest, did not appear on the stage until 1826, six years later than Forrest. Mrs. Duff made her first appearance in 1810 as Juliet, and while on the stage, a period of 26 years, was regarded as the foremost actress in America. In 1838 she left the theater and went into a self-imposed retirement, having taken upon herself a religious life. Fanny Kemble was another brilliant star. She was hailed as a beauty as well as a genius, and during her time she had none to dispute her place or sway. She left the stage in 1834 and married. Several plays came from her pen, the best known being *Francis the First*. Charlotte Cushman, acknowledged by all as the greatest actress in America, began as a singer, and was for a time prima donna at New Orleans, but the climate affecting her voice she gave up singing and became an actress. Her influence did more, probably, to elevate the stage and break down Puritanical prejudice than that of all other actresses combined.

Charles Mathews, whose eccentric comedy was as highly esteemed in England as Kemble's light comedy, first appeared in America in 1822. His trip was profitable and he returned to England. In a play written by himself and acted in London, called *Mathews in America*, there were many caricatures which gave great offense to the sensitive Americans, and which were not readily forgiven. His son, Charles James, usually known as Charles Mathews "the younger," appeared in 1834. He was a comedian of extraordinary lightness and ease, and his influence on the younger generation still survives.

The drama had grown to large proportions, and each succeeding year witnessed the advent of brilliant geniuses. In



1836 James H. Hackett, the first to make a specialty of Yankee parts, went on the stage. He journeyed to England and introduced the stage Yankee to the English public with great success. Hackett was probably the earliest performer of Rip Van Winkle. He repeated his visit to England, when George Handel Hill became the favorite as a delineator of Yankee character. Hill followed to England, and even went to Paris, but the Parisians failed to appreciate his *Solomon Snugg*, and but a few performances were given.

Dan Marble, as Sam Patch, appeared in 1838; F. S. Chantreau, in *Mose*, the *New York Fireman*, and later, in *Kit*, the *Arkansas Traveler*, achieved a remarkable success. Joseph Jefferson, in *Our American Cousin*, and later, in *Rip Van Winkle*, has surpassed all his fellow actors. The ease and simplicity of his method stand widely apart from the mannerism of his surroundings, and for more than twenty years his *Rip Van Winkle* has held the stage. The play as given by Hackett, was re-written at the request of Jefferson, by Dion Boucicault, with suggestions and emendations by Jefferson, and has proved one of the most remarkable successes on the American stage.

With the increase in the number of stars, it began to be difficult to get a good stock company together. At first stars acted only on special nights, but for personal profit eventually were willing to act every night. Then the star, seeing that the manager relied on him or her to get people into the house, demanded the lion's share of the profits.

In the latter part of the history of the American drama, the array of prominent names is very large. James W. Wallack, the handsome, dashing actor, gentlemanly and popular in the best and most refined society; William E. Burton, perhaps the best actor of broad, low-comedy parts; John Brougham, the genial Irish-American actor and author; John Lester Wallack; Augustin Daly; Edwin Booth, the son of Junius Brutus Booth, and the heir of much, if not all, his father's histrionic genius, and who still (1891) holds captive at his will his audiences; Dion Boucicault; and scores of others, have made the American stage one of the great forces in the advancement of science, learning and civilization.

On April 1, 1891, the number of theaters and opera-houses in the United States was about 3,100; number of actors, actresses, and professional singers actively employed, 5,127; number of professional itinerant theatrical operative, and musical "attractions," 347. The following list embraces the names of the professional theatrical, dramatical, musical actors and singers in January, 1891:

| Name.                     | Birthplace.           | Born. |
|---------------------------|-----------------------|-------|
| Albani, Emma.....         | Chamby, Canada.....   | 1837  |
| Albaugh, John W.....      | Mid-west, Md.....     | 1843  |
| Aldrich, Louis.....       | Mid-ocean, Cal.....   | 1859  |
| Anderson, Mary.....       | Sacramento, Cal.....  | 1859  |
| Arditi, Luigi.....        | Piedmont, Italy.....  | 1822  |
| Atherton, Alice.....      | Cincinnati, O.....    | 1854  |
| Bandmann, Daniel E.....   | Cassel, Germany.....  | 1839  |
| Bangs, Frank C.....       | Alexandria, Va.....   | 1836  |
| Barrett, Lawrence.....    | London, England.....  | 1838  |
| Bateman, Isabel.....      | Cincinnati, O.....    | 1854  |
| Bateman, Kate.....        | Baltimore, Md.....    | 1842  |
| Bernhardt, Sarah.....     | Paris.....            | 1844  |
| Boniface, George C.....   | New York City.....    | 1832  |
| Booth, Agnes.....         | Australia.....        | 1843  |
| Booth, Edwin.....         | Belair, Md.....       | 1833  |
| Bowers, Mrs. D. P.....    | Stamford, Conn.....   | 1830  |
| Buchanan, Virginia.....   | Cincinnati, O.....    | 1846  |
| Burgess, Neil.....        | Boston, Mass.....     | 1846  |
| Burroughs, Marie.....     | San Francisco.....    | 1806  |
| Campanini, Italo.....     | Parma, Italy.....     | 1846  |
| Cayvan, Georgia.....      | Philadelphia, Pa..... | 1858  |
| Chanfrau, Mrs. F. S.....  | Philadelphia, Pa..... | 1837  |
| Clarke, George.....       | Brooklyn, N. Y.....   | 1810  |
| Clarke, John S.....       | Baltimore, Md.....    | 1835  |
| Claxton, Kate.....        | New York City.....    | 1848  |
| Cody, William F.....      | Scott Co., Iowa.....  | 1845  |
| Coghlan, Rose.....        | Peterboro, Eng.....   | 1853  |
| Couldock, Charles W.....  | London, Eng.....      | 1815  |
| Crabtree, Lotta.....      | New York City.....    | 1847  |
| Crane, William H.....     | Leicester, Mass.....  | 1815  |
| Daly, Augustin.....       | North Carolina.....   | 1838  |
| Damosch, Walter.....      | Breslau, Prussia..... | 1862  |
| Dauvray, Heien.....       | Cincinnati, O.....    | 1858  |
| Davenport, Mrs. E. L..... | London, Eng.....      | 1839  |
| Davenport, Mary.....      | London, Eng.....      | 1850  |
| Dickinson, Anna.....      | Philadelphia, Pa..... | 1842  |
| Dillon, Louise.....       | Savannah, Ga.....     | 1857  |
| Dixey, Henry E.....       | Boston, Mass.....     | 1859  |
| Dreher, Virginia.....     | Louisville, Ky.....   | 1858  |
| Drew, John.....           | Philadelphia, Pa..... | 1833  |
| Drew, Mrs. John.....      | London, Eng.....      | 1818  |
| Edouin, Willie.....       | Brighton, Eng.....    | 1845  |
| Edwards, Henry.....       | Bristol, Eng.....     | 1824  |
| Ellsler, Effie.....       | Philadelphia, Pa..... | 1858  |
| Emmet, Joseph K.....      | St. Louis, Mo.....    | 1841  |
| Eyttinge, Rose.....       | Philadelphia, Pa..... | 1837  |

| Name.                       | Birthplace.             | Born. |
|-----------------------------|-------------------------|-------|
| Fawcett, Owen.....          | London, Eng.....        | 1838  |
| Fisher, Charles.....        | Suffolk, Eng.....       | 1815  |
| Florence, William J.....    | Albany, N. Y.....       | 1841  |
| Florence, Mrs. W. J.....    | New York City.....      | 1846  |
| Germou, Ette.....           | Augusta, Ga.....        | 1845  |
| Gerster, Etelka.....        | Kaschau, Hungary.....   | 1857  |
| Gilbert, Mrs. G. H.....     | Rochdale, Eng.....      | 1810  |
| Goodwin, Nat. C.....        | Boston, Mass.....       | 1817  |
| Harrigan, Edward.....       | New York City.....      | 1815  |
| Hart, Tony.....             | Worcester, Mass.....    | 1853  |
| Hauk, Minnie.....           | New Orleans, La.....    | 1853  |
| Haworth, Joseph S.....      | Providence, R. I.....   | 1855  |
| Heron, Bijou.....           | New York City.....      | 1863  |
| Holland, E. M.....          | New York City.....      | 1848  |
| Hill, Charles Barton.....   | Dover, Eng.....         | 1828  |
| Huntington, Agnes.....      | New York City.....      | 1828  |
| Irving, Henry.....          | Keinton, Eng.....       | 1838  |
| James, Louis.....           | Tremont, Ill.....       | 1842  |
| Janauscheck, Francesca..... | Prague, Austria.....    | 1850  |
| Janisch, Antonie.....       | Vienna, Austria.....    | 1850  |
| Jansen, Marie.....          | Boston, Mass.....       | 1829  |
| Jefferson, Joseph.....      | Philadelphia, Pa.....   | 1829  |
| Kendal, Mrs. W. H.....      | Lincolnshire, Eng.....  | 1849  |
| Keene, Thomas W.....        | New York City.....      | 1840  |
| Kellogg, Clara Louise.....  | Sumterville, S. C.....  | 1842  |
| Kelcey, Herbert H. L.....   | London, Eng.....        | 1855  |
| Langtry, Lily.....          | St. Helens, Jersey..... | 1850  |
| Leahy, Henry.....           | New York City.....      | 1856  |
| Lewis, Catherine.....       | Wales.....              | 1836  |
| Lewis, James.....           | Troy, N. Y.....         | 1839  |
| Lucca, Pauline.....         | Vienna.....             | 1840  |
| Mackaye, Steele.....        | Buffalo, N. Y.....      | 1843  |
| Maddern, Minnie.....        | New Orleans, La.....    | 1865  |
| Mansfield, Richard.....     | Helligoland, Ger.....   | 1857  |
| Mantell, Robert B.....      | Ayrshire, Scotland..... | 1854  |
| Martinet, Sadie.....        | Yonkers, N. Y.....      | 1857  |
| Mather, Margaret.....       | Detroit, Mich.....      | 1861  |
| Mayo, Frank.....            | Massachusetts.....      | 1839  |
| Mitchell, Maggie.....       | New York City.....      | 1832  |
| Modjeska, Helena.....       | Poland.....             | 1844  |
| Mordau, Frank.....          | Burlington, Vt.....     | 1841  |
| Morris, Clara.....          | Cleveland, Ohio.....    | 1846  |
| Murphy, Joseph.....         | Brooklyn, N. Y.....     | 1839  |
| Nilsson, Christine.....     | Sweden.....             | 1843  |
| O'Neill, James.....         | Ireland.....            | 1849  |
| Oualitz, Clara.....         | Berlin, Prussia.....    | 1867  |
| Past, Adeline.....          | Madrid.....             | 1843  |
| Phillips, Gus.....          | New York City.....      | 1837  |
| Pixley, Annie.....          | New York City.....      | 1856  |
| Ponisi, Madame.....         | Huddersfield, Eng.....  | 1825  |
| Pope, Charles.....          | Germany.....            | 1832  |
| Proctor, Joseph.....        | Marlborough, Mass.....  | 1816  |
| Rankin, A. McKee.....       | Sandwich, Canada.....   | 1844  |
| Reed, Roland.....           | Philadelphia, Pa.....   | 1859  |
| Rehan, Ada.....             | Limerick, Ireland.....  | 1860  |
| Rhea, Mlie.....             | Brussels.....           | 1855  |
| Ristori, Adelaide.....      | Italy.....              | 1821  |
| Robinson, Frederick.....    | London, Eng.....        | 1832  |
| Robson, Stuart.....         | Azempolis, Md.....      | 1836  |
| Rossi, Ernesto.....         | Leghorn, Italy.....     | 1829  |
| Roze, Marie.....            | Paris.....              | 1846  |
| Russell, Annie.....         | New York City.....      | 1860  |
| Russell, Lillian.....       | Clinton, Ia.....        | 1860  |
| Russell, Sol Smith.....     | Brunswick, Mo.....      | 1848  |
| Salvini, Tommaso.....       | Milan, Italy.....       | 1830  |
| Sand, William.....          | Springfield, Mass.....  | 1856  |
| Scott-Siddons, Mrs. J.....  | India.....              | 1844  |
| Stanhope, Adeline.....      | Paris, France.....      | 1854  |
| Stanley, Alma Stuart.....   | Jersey, Eng.....        | 1860  |
| Stevenson, Charles A.....   | Dublin, Ireland.....    | 1842  |
| Stoddart, J. H.....         | Yorkshire, Eng.....     | 1827  |
| Stueby, John B.....         | Boston, Mass.....       | 1832  |
| Sullivan, Barry.....        | Birmingham, Eng.....    | 1824  |
| Sully, Daniel.....          | Detroit, Mich.....      | 1852  |
| Tearle, Osmond.....         | Plymouth, Eng.....      | 1835  |
| Terris, William.....        | London, Eng.....        | 1819  |
| Terry, Ellen.....           | Coventry, Eng.....      | 1848  |
| Thomas, Theodore.....       | Essens, Germany.....    | 1835  |
| Thompson, Charlotte.....    | Birmingham, Eng.....    | 1843  |
| Thompson, Denman.....       | Girard, Pa.....         | 1833  |
| Thompson, Lydia.....        | London, Eng.....        | 1838  |
| Thorne, Edwin F.....        | New York City.....      | 1845  |
| Thursby, Emma.....          | Brooklyn, N. Y.....     | 1857  |
| Toole, John L.....          | London, Eng.....        | 1832  |
| Turpin, Charles.....        | St. Charles, Iowa.....  | 1862  |
| Vezin, Hermann.....         | Philadelphia, Pa.....   | 1829  |
| Vokes, Rosina.....          | London, Eng.....        | 1854  |
| Ward, Frederick.....        | Wadington, Eng.....     | 1851  |
| Wheatcroft, Nelson.....     | London, Eng.....        | 1852  |
| Williams, Gus.....          | New York City.....      | 1847  |

\* Died in New York, 1891

**DRANESVILLE**, Fairfax county, Va., 17 miles northwest of Washington. A battle was fought here Dec. 20, 1861, between the Union and the Confederate troops.

**DRAPER, HENRY** (1837-82), an American physicist. He traveled in Europe, and on his return built the observatory at Hastings-on-Hudson; was appointed on the medical staff in Bellevue hospital; New York city; in 1860 became professor of physiology in the University, and in 1866 held a similar position in the medical department. In 1874 Congress appointed him to superintend the photographic department of the commission appointed to observe the transit of Venus. He made numerous discoveries in astronomy through his photography of the heavenly bodies.

**DRAPER, JOHN WILLIAM** (1811-82), an American scientist, born in England; he came to the United States in 1832, and in 1836 became professor of chemistry and natural philosophy in Hampden-Sidney College, Va. From 1840 to 1881 he was connected with the medical department of the University of New York. He made numerous important investigations in chemistry and other subjects, and wrote many valuable works.

**DRAPER, LYMAN COPELAND**, an American antiquarian, born in 1815. In 1838 he began to interview western pioneers, thus collecting valuable historical information. In 1859 he went to Madison, Wis., and became corresponding secretary of the New York State Historical Society. In 1887 he was appointed honorary secretary for life. He published works on various subjects. Died Aug. 26, 1891.

**DRAPER, WILLIAM HENRY**, American physician, born in 1830. In 1869 he became clinical professor of diseases of the eye and ear in the College of Physicians and Surgeons, and in 1880 was appointed professor of clinical medicine. In 1886 he became president of the New York Academy of Medicine.

**DRAPERY, IN ART.** From the very great difficulties with which the artist has to struggle in dealing with the arbitrary and ungraceful forms of modern dress, we are often led to regard drapery as an impediment, in place of an aid and accessory, to the representation of the human form in plastic art. The erroneous nature of such a conception will be manifest at once to those who direct their attention to the study of drapery in antique art, with a view to discovering, not so much how as why it was employed by a people whose national customs admitted of their almost wholly dispensing with it had they felt so disposed. Such a study will convince us that, when properly disposed, drapery tends in many cases to exhibit the form, to enhance the characteristics, and to intensify the attitude, whether in action or in repose. It tells, moreover, something of the circumstances in which the action takes place beyond what could possibly be told by the naked figure.

**DRAUGHT, or DRAUGHT OF WATER:** in maritime affairs, a technical name for the depth to which a ship sinks in the water when fairly afloat. The draught is marked on the stem or stern-post, or both, from the keel upward. When a ship is in good trim, the draught does not differ much at the two ends. Ships with sharp bottoms draw more water, or have a "greater draught," than those of flatter construction.

**DRAUGHTSMAN.** A draughtsman differs from a designer, inasmuch as he lays no claim, in that capacity at all events, to the character of an originator.

**DRAVE** (Ger., *Draw*), a river in Austria. The valleys through which it flows in its course through Carinthia, Styria, and Croatia are distinguished for great fertility and picturesque scenery. while

the population upon its banks is numerous and industrious. In Slavonia, the Drave is frequently bordered by dense forests.

**DRAWBACK**, a term in commerce, employed in connection with the remitting or paying back of excise duties on certain classes of articles exported. Excise duties, as a matter of course, enhance by so much the natural price of the commodity on which they are imposed. Were these duties not remitted, the commodity so taxed would not be ordered from those foreign countries where articles of the same kind could be purchased free of such duties. To afford facility for the exportation of these articles, the state resorts to the expedient of returning to the exporter a sum equal in amount to what he or the manufacturer had paid to the excise.

**DRAW-HEAD:** in railway mechanics, a buffer to which a coupling is attached.

**DRAWING-BOARD**, a board on which drawing-paper is strained for painting on in water-colors. The paper is wetted for the purpose of being strained, and when attached at the edges it is permitted to dry and contract. Formerly the drawing-board was fitted into a frame, the edges of the wet paper being made fast by the pressure of the frame on the board. But the much simpler drawing-board which is now in use is made of a flat piece or pieces of wood, held together and prevented from warping by an edging of other pieces, the grain of which runs in the opposite direction. The wet paper is attached to the board with paste or thin glue, and when dry becomes perfectly firm and flat. When the work is finished, the paper is cut beyond the drawing with a knife.

**DRAW-PLATE**, a steel plate with a graduated series of holes, through which metals are drawn in making them into wires or bars. Also a name given to a plate of metal placed before a fire or before the lateral opening between the top of the fireplace and the throat of the chimney. Its use is to force the air to pass through the fire on its way into the chimney, instead of allowing it to pass over the fire.

**DRAYTON-IN-HALES**, or **MARKET DRAYTON**, a town in the northeast of Shropshire, Eng. Here in 1459 the Yorkists defeated the Lancastrians, with great loss. Population, 4,039, chiefly agricultural.

**DRAYTON, WILLIAM HENRY**, statesman, born in Drayton Hall, on Ashley River, S. C., in September, 1742, died in Philadelphia, in September, 1779. He was educated in England, at Westminster School and Balliol College, Oxford, and after his return to this country studied law, was admitted to the bar, and became an active writer on political topics. He opposed the patriotic associations in the colonies, and in 1771 received from the king the appointment of privy counselor for the province of South Carolina. As the Revolutionary crisis approached, however, his sentiments changed, and he was suspended from his offices under the crown. In 1775 he became a member of the "Council of Safety," of which he was soon after made president; was president of the provisional congress in 1776; privy counselor, and chief justice of the State; and in 1778 was elected a delegate to the Continental Congress, of which he continued a member till his death. He left a record of the events of the Revolution, which was published in 1821 under the title of *Memoirs of the American Revolution*.

**DRED SCOTT CASE.** See **UNITED STATES, BRITANNICA**, Vol. XXIII, p. 772.

**DRESSINGS**, in architecture, a term loosely used to signify moldings and all the simpler kinds of sculptured decorations.

**DREW, DANIEL**, capitalist, born in Carmel, Putnam county, N. Y., in 1788, died in New York city



Sept. 19, 1879. He engaged in steamboat building, was afterwards connected with railroad enterprises, and became a prominent speculator in Wall street. He amassed a fortune which was at one time variously estimated at from \$5,000,000 to \$15,000,000, but afterwards lost heavily and was ultimately compelled to go into bankruptcy. Mr. Drew founded the Drew Ladies' Seminary at Carmel, gave large sums to Wesleyan University, Middletown, Conn., and in 1866 gave \$250,000 towards founding the Drew Theological Seminary of Madison, N. J., the sum being afterwards increased by him to nearly \$1,000,000.

DREW THEOLOGICAL SEMINARY, under the control of the M. E. Church, was founded at Madison, N. J., by a donation of half a million dollars from Daniel Drew (*q. v.*), in 1868, and chiefly organized by its first president, Rev. Dr. McClinton. On the death of Dr. McClinton, Rev. Dr. R. S. Foster was made president, and managed the institution with conspicuous success until his elevation to the episcopate in 1872. He was succeeded by Rev. Dr. J. F. Hurst, who in 1880 was also made bishop, and the Rev. Dr. H. A. Buttz became the fourth president.

DRIFT: in navigation, a technical name for the deviation which a ship's course receives by the action of a contrary wind.

DRIFT, a name given to the boulder-clay, a deposit of the Pleistocene epoch. More fully, it is called the Northern Drift, Glacial Drift, or Diluvial Drift, in allusion to its supposed origin. Drift-wood is wood carried by tides and currents to a distance from its native locality. Specimens thus transported have been observed in the marine strata of the chalk, London clay, and other formations. Sand-drift is sand driven and accumulated by the wind.

DRIFT: in mechanics, a conical hand-tool of steel for enlarging or shaping a hole in metal by being driven through or into it.

DRILLS, tools or instruments used for boring holes in metals, or other hard substances. They are usually made of a square steel bar, flattened out at the cutting end: this part is brought to an angular point like a spear-head, and the cutting edges are beveled in opposite directions. There are numerous other forms, however, adapted to the various kinds of work to be performed.

DRINKING USAGES. Some of these are of great antiquity, and all are interesting in connection with the history of manners. Besides sacrifices of animals and articles of food, the Hebrews made drink-offerings a solemn religious service. To mark the spot where he communed with God, Jacob set up a pillar of stone, and "poured a drink offering thereon" (Gen. xxxv, 14). We learn that such sacrifices were not made alone to the true God, for women are said to have poured out "drink-offerings unto other gods" (Jer. vii, 18). Such a statement is amply verified by pagan writers. Among the Greeks and Romans, the pouring out of a libation to the gods was a common religious observance.

DRIPOSTON (Fr., *larmier*), a projecting molding or tablet placed over the head of a Gothic door-way or window, for the purpose of throwing off the water, whence it is also known as a water-table or weather-molding. Though such was, no doubt, its primitive use, the drip-stone latterly became a mere ornamental appendage, which served to enrich and define the outline of the arch. The drip-stone is not so constant a feature in Continental as in English Gothic.

DRIVING. In the United States, furious driving in cities generally is a misdemeanor, punishable by

fine and imprisonment. In the absence of State laws, municipalities regulate the rate of driving.

DROMORE, a town in the northwest of County Down, Ireland, on the Lagan, 17 miles southwest of Belfast, by rail. It is noted for its linen manufactures, and as the burial-place of Jeremy Taylor.

DROSERACEÆ. See INSECTIVOROUS PLANTS, *Britannica*, Vol. XIII, pp. 134-140.

DROUYN DE LHOÛS, EDOUARD (1805-81), a French statesman. He was attached to the embassies at Madrid and at The Hague. In 1840 he was placed at the head of the commercial department under the minister of foreign affairs, and shortly after was elected deputy for Melun. Under Louis Napoleon's presidency he became minister of foreign affairs, and in 1849 went to London as ambassador. In 1855 he resigned his office. In 1863 he was recalled, resigning again in 1866.

DROWNING, as a capital punishment, was long the custom. Tacitus tells us that the Germans hanged their greater criminals, but that meaner and more infamous offenders were plunged under hurdles into bogs and fens. Drowning was also a Roman punishment. The *Lex Cornelia* decreed that parricides should be sown up in a sack with a dog, cock, viper, and ape, and thrown into the sea. The Anglo-Saxon codes ordered women convicted of theft drowned. The pit, ditch, or well was for drowning women; but the punishment was sometimes inflicted on men. So lately as 1611, a man was drowned at Edinburgh for stealing a lamb. The custom survived in Scotland until 1685, and in France as late as 1793.

DROYLSDEN, Lancashire, a suburb of Manchester, three and one-half miles east of it, with railway station. Population, about 9,000.

DROYSEN JOHANN GUSTAV (1808-84), a German historian. In 1840 he became professor of history at Kiel; in 1851 was called to the University of Jena, and from 1859 to his death occupied a chair in the University of Berlin. He wrote many popular historical works.

DRUGGET, a woven and felted coarse woolen fabric, usually with a printed pattern, chiefly used for covering carpets, and hence often called crumb-cloth. The name is also given to a stout dress fabric made with a linen warp and a worsted weft. This stuff is still made by handloom in Scotland.

DRUIDS, the priests among the ancient Germans, Gauls, and Britons, so called from their veneration of the oak. They headed the Britons who opposed Cæsar's first landing, 55 B. C., and were exterminated by the Roman governor, Suetonius Paulinus, 61. A. D.

DRUM, a Celtic word meaning the back, and applied to a small hill or ridge of hills. It enters into the composition of many place-names, especially in Ireland and Scotland, as *Drumcondra*, *Drumglass*, *Drumshough*.

DRUM-MAJOR, the name given to the officer who receives orders from the major of the battalion concerning the necessary beats or signals, and communicates them to the drummers.

DRUMMOND ISLAND, the most westerly of the Manitoulin chain, in Lake Huron, belonging to Chippewa county, Mich. It is 20 miles long by 10 wide.

DRUMMOND LIGHT, or LIME-BALL LIGHT, a very intense light, produced by directing an ignited stream of oxygen gas, and also one of hydrogen, or coal gas, upon a ball of lime.

DRURY, DAU, a silversmith of London, born Feb. 4, 1725, died Dec. 15, 1803. He was devoted to the study of entomology and to collecting exotic insects.

**DRYBURGH**, a beautiful ruined abbey in Berwickshire, five miles east-southeast of Melrose, on the Tweed. It contains the dust of Sir Walter Scott and of his son-in-law Lockhart.

**DRYDEN**, a village of Tompkins, county, N. Y., 30 miles north of Owego. It contains a graded school, a woolen mill, tannery, and a newspaper office. It has a magnetic spring, and Dryden Spring Place attracts many health-seekers.

**DRY TORTUGAS**, a group of ten small, low islands belonging to Monroe county, Fla., and situated 40 miles west of the most western of the Florida Keys. On these islands stand two light-houses. There is an important fortification, Ft. Jefferson, on Garden Key, which, during the civil war, was used as a penal station for Confederate prisoners, and in which prisoners under sentence of court-martial are occasionally confined.

**DRYING-MACHINE**, a name applied to an apparatus for drying long webs of calico and other fabrics. It consists of a series of metal cylinders revolving in an iron frame, and heated internally with steam. Sometimes the rollers are arranged in vertical, sometimes in horizontal lines, and the cloth passes over them in a continuous web.

**DRY-POINT**, a sharp etching-needle, used to incise fine lines in copper, without the plate being covered with etching-ground, or the lines bit in by acid.

**DUAL**, the form given in some languages to a noun or a verb, when only two things are spoken of.

**DUALISM**, the name given to a philosophical theory, according to which some two principles, of different nature, original, and incapable of being derived the one from the other, lie at the bottom of everything; as, for example, the ideal and the real, or the material and the thinking substance. In a narrower and theological sense, dualism means the assumption of two original beings a good and an evil, or of two distinct principles in man, a bodily and a spiritual.

**DUANE, WILLIAM** (1760-1835), an American journalist. In 1784 he went to India, and became editor of a journal entitled "The World." Later he was editor of the "General Advertiser" (now the "London Times"); in 1795 he returned to the United States and became editor of the leading Democratic organ, the "Philadelphia Aurora." He wrote for publication several works on political and military topics.

**DUANE, WILLIAM JOHN** (1780-1865), an American politician. He was at one time assistant editor of the "Philadelphia Aurora," and in 1833 was appointed Secretary of the United States Treasury. He wrote some works on political topics.

**DUBITZA**, a fortified town on the northern frontier of Bosnia, on the right bank of the Unna, 10 miles from its confluence with the Save. In 1879 Dubitza, with the rest of Bosnia, passed under Austrian administration. Population, 3,000.

**DUBOIS**, a village of Clearfield county, Pa., located in the coal region, 129 miles northeast of Pittsburgh. It has a machine shop, planing and lumber-mills, and a sash and blind factory.

**DU BOIS, JOHN** (1764-1842), a French-American Roman Catholic bishop. He was ordained in 1787, and appointed assistant rector of the parish of St. Sulpice and chaplain to the insane asylum called the *Hospice des Petits Maisons*. In 1791 he arrived in Norfolk, Va., and was appointed pastor in that city, and later in Richmond, Va. He afterwards preached in various States, and in 1826 was appointed bishop of New York.

**DU BOIS-REYMOND, EMIL**, physiologist, born in Berlin, Nov. 7, 1818. In 1841 he began the researches

in animal electricity with which his name is chiefly identified. In 1858 he succeeded Joh. Müller in the chair of physiology at Berlin, and in 1867 he was elected permanent secretary of the Academy of Sciences.

**DUBUQUE**, a city of Iowa, and county-seat of Dubuque county (see Britannica, Vol. VII, p. 504). Dubuque is an old and very wealthy city, an important railroad point, and the headquarters for the business of the lead region of the Northwest. It has extensive manufactories of carriages, wagons, and plows, and its lumber and pork-packing interests are large. It has also manufactories of woodenware, brick, leather, white lead, shot, engines, machinery, farming implements, beer, flour, soap, candles, artificial stone, boots and shoes, etc. In addition to an excellent system of public schools, its educational interests include a German Presbyterian Theological Seminary, St. Joseph College and Academy (Catholic), St. Mary's Academy, the Iowa Institute of Science and Arts, several convents, a business college, and an Episcopalian school. Population in 1880, 22,254; in 1890, 30,147.

**DUCAMP, MAXIME**, a miscellaneous writer, born at Paris, Feb. 8, 1822. He made repeated journeys in the East, and ultimately settled in Paris. He wrote of his Eastern travels, also poems, romances, a history of the Commune, and a great work on Paris.

**DUCAT**, a gold coin, formerly in extensive use on the Continent, deriving its name probably from *Dukas*, the family name of the Byzantine Emperors, Constantine X and Michael. The ducat varied in weight and fineness; the most common being worth about \$2.35. The modern Italian ducat was of much less value.

**DUCATO CAPE**, an abrupt headland at the southwest extremity of Leukas or Santa Maura, one of the Ionian islands, dreaded by sailors for the fierce currents around it. From its summit criminals were anciently cast into the sea.

**DU CHAILLU, PAUL BELLONI**, an American author and traveler, born in Paris, July 31, 1835. At an early age he went to live in the French settlement at the mouth of the Gaboon, Africa. In 1852 he visited the United States, of which he became a citizen. From 1855 to 1859 he explored the region on the west coast of Africa and brought back to New York numerous specimens of birds and quadrupeds, previously unknown. In 1863 he set out from England for another trip to western Africa. In 1867 he published his *Journey to Ashango Land*. He has traveled extensively in Scandinavia, Lapland, and Finland, of which he has given a description in his *Land of the Midnight Sun*. The *Viking Age* appeared in 1889.

**DUCHÉ, JACOB** (1737-98), an American clergyman. He was licensed to officiate as an assistant in the churches of Philadelphia in 1759, and in 1775 became rector of Christ Church in that city. In 1776 he was chosen chaplain of Congress, but resigned the same year and went to England. He returned to the United States in 1790.

**DUCHOBORTZI**, a sect of Russian mystics, traceable to the 18th century, who depend upon an inward light, like the Quakers, attach little importance to the sacraments, priesthood, and services of the church, and reject the doctrine of the Trinity and the divinity of Christ. The Emperor Alexander I allowed them to settle in Taurida, in South Russia; Nicholas I, in 1841, transferred them to Transcaucasia.

**DUCK RIVER** rises in Coffee county, Tenn., follows a westward course, and enters the Tennessee River 16 miles southwest of Waverly. Its length is about 200 miles.



**DUCKING-STOOL**, an apparatus at one time in use in England for the punishment of scolding wives. It consisted of a strong chair attached to one end of a beam, which worked on a pivot on a post bedded into the ground at the edge of the dam or river. The woman was placed in the chair with her arms drawn downwards; a bar was placed across her back and in front of her elbows; another bar held her upright, and cords tied her securely in. The executor of the punishment then took hold of a chain at the opposite end, and gave her a ducking on the "see-saw" principle.

**DUCKWEED**, or **DUCK-MEAT**, the type of *Lemnaceæ*, a small order of very degenerate monocotyledons, probably allied to *Araceæ*. They are chiefly floating plants, mere flat green fronds, with roots hanging loosely in the water, and with unisexual flowers—destitute of calyx and corolla—bursting through a membranous spathe in their margin. The *Lemnaceæ* are distributed through all parts of the world.

**DUDLEY, BENJAMIN WINSLOW** (1785-1870), an American surgeon. He studied medicine in America and Europe, and practiced in Lexington, Ky., until 1854. He operated two hundred and twenty-five times for stone in the bladder, and lost but six patients. He was for many years professor of anatomy and surgery in the Transylvania University.

**DUDLEY, EDMUND** (1462-1510), a lawyer and privy-councillor, and Empson's partner in carrying out the detested policy of Henry VII, whose son and successor sent him to the block. He was father of the Duke of Northumberland.

**DUER, JOHN**, an American jurist, born in Albany, N. Y., Oct. 7, 1782, died on Staten Island, Aug. 8, 1858. He studied law, and acquired reputation in New York city as an insurance lawyer. He was delegate to the State constitutional convention in 1821, appointed one of the commissioners to revise the statute law of the State in 1825, and was elected an associate judge of the superior court, becoming chief justice in 1857. He published a number of works, one of which, *A Treatise on the Law and Practice of Marine Insurance*, has become a standard authority in the United States.

**DUET**, a composition in music for two voices or instruments.

**DUE WEST**, an educational village of Abbeville county, S. C., containing Erskine College, Erskine Theological Seminary, a female college, and a fine public library.

**DUFF, ALEXANDER**, an Indian missionary, born in Perthshire, April 26, 1806, died in Edinburgh, Feb. 12, 1878. In 1829 he was ordained first missionary from the Church of Scotland to India. On his passage he was twice shipwrecked, and did not reach Calcutta till May, 1830. In 1834 he was obliged to return home on account of ill-health, but in 1840 he went again to India and found the work he had left maintaining its success. In 1849 ill-health again obliged him to return home. In 1854 he made a tour of the United States, and his apostolic fervor in his missionary work called forth extraordinary enthusiasm. The University of Aberdeen conferred the degree of D. D. upon him, and the University of New York that of LL. D.

**DUFFERIN AND AVA, FREDERICK TEMPLE HAMILTON BLACKWOOD**, Marquis of, a British statesman, born in 1826. In 1860 he was sent as a commissioner to Servia, and from 1864 to 1866 was under-secretary of state for India. He was in 1866 under-secretary of war, and in 1872 became governor-general of Canada. In 1879 he was appointed ambassador at St. Petersburg. In 1884 he became viceroy of India. He resigned in 1888, and was

appointed ambassador at Rome. Of his numerous literary works his narratives of travel have been the most popular. In 1890 he published a volume containing the able speeches which he had delivered while viceroy of India; and in the same year Lady Dufferin published *Our Viceregal Life in India*, and a *Record of Three Years' Work* in connection with the education of women as medical practitioners in India.

**DUFFIELD, GEORGE** (1732-1790), an American clergyman. He was ordained in 1761, and took charge of the Presbyterian churches in Carlisle, Big Spring, and Monaghan, Pa. In 1766 he made a mission tour through Pennsylvania, Maryland and Virginia, and in 1771 took charge of the third Presbyterian church in Philadelphia. During the Revolution he served as chaplain, and later was the first stated clerk of the general assembly. He held this position until his death.

**DUFFY, SIR CHARLES GAVAN**, an Irish patriot, born in County Monaghan in 1816. He was for a time a journalist in Dublin and Belfast. In 1844 he was tried and convicted for sedition, but saved by the House of Lords quashing the conviction; he next helped to found the Irish Confederation. Again in 1848 he was tried for "treason-felony" and acquitted. In 1856 he went to Australia, where he practiced law at Melbourne. In 1871 he was made prime minister, and in 1873 was knighted. In 1877 he was elected speaker of the legislative assembly. He wrote several books on Ireland.

**DUHAMEL, JOSEPH THOMAS**, a Canadian R. C. archbishop, born in 1841. He was ordained priest in 1863, and became curé of Buckingham. In 1874 he was consecrated bishop of Ottawa, and in 1886 became first archbishop. He is a count of the Holy Roman Empire, an assistant at the Pontifical throne, and a knight and grand cross of the Order of the Holy Sepulchre.

**DÜHRING, EUGEN KARL**, a German philosopher and political economist, born in 1838. He was appointed referendary in the court of justice, but resigned and devoted himself to the study of philosophy and national economy. From 1864 to 1877 he was a privatdozent in the Berlin University. He has published extensively on economical and philosophical subjects.

**DUKE CENTER**, a village of McKean county, Pa. It has a lumber mill and several oil-wells.

**DULCE**, a lagoon of Guatemala, communicating with the Atlantic.

**DULCIMER**, a musical instrument resembling a flat box, with sounding board and bridges, across which run wires tuned by pegs at the sides, and played on by striking the wires with a small piece of wood in each hand, or more usually with two cork-headed hammers. The dulcimer is one of the most ancient of instruments appearing in Assyrian sculptures, and may be regarded as the ancestor of the piano.

**DULUTH**, a city of Minnesota, and county-seat of St. Louis county (see *Britannica*, Vol. VII, p. 520). Duluth is a port of entry most advantageously situated at the western extremity of Lake Superior, at the head of navigation on the great lakes. It is also at the eastern terminus of the Northern Pacific Railroad. The harbor of Duluth has recently been greatly improved by the United States Government, which has expended large sums in dredging, and in the construction of an artificial breakwater. The harbor is further protected by a narrow strip of land, called Minnesota Point, which forms a natural breakwater, and through which there is a ship canal. Numerous regular lines of steamers connect the city with the lake ports, Duluth has twelve public schools, the buildings for

which cost \$500,000; a high school, which occupies a palatial building costing \$300,000; numerous private schools; a business college; the Duluth Yale school; a college preparatory for girls, and a Catholic parochial school. There is also a large public library. Duluth has one of the finest park and boulevard systems in America. The terrace or boulevard drive, which is nine miles in length and winds about the hillsides at a height in some places of 500 feet above the lake shore, connects Glenwood, Grand View and Cascade Parks. This system of driveway and parks is being rapidly extended, and will cover about 50 miles. Extensive deposits of iron, granite, and freestone are found in the vicinity. The growth of Duluth during the last decade has been remarkable, the population in 1880 being 3,483, and in 1890, 32,725.

**DUMAS, ALEXANDRE**, a French dramatist, born in 1824. He began writing at the age of 17, and since has written many plays and novels. In 1884 he became commander of the Legion of Honor. His principal work is *La Dame aux Camélias*. His drama entitled *Francillon* was produced at the Théâtre Français in 1887.

**DUMAS, JEAN BAPTISTE ANDRÉ** (1800-84), a French chemist. He made numerous important discoveries in organic chemistry, isomerism, the law of substitutions, and other departments of chemical philosophy. From 1849 to 1851 he was minister of agriculture and commerce, and afterwards became a life-senator. His chief work is a *Treatise on Chemistry Applied to the Arts*.

**DU MAURIER, GEORGE LOTIS PARMELLA BUSSON**, caricaturist and book illustrator, born in Paris, March 6, 1834. In 1851 he studied chemistry at University College, London, but returned to Paris and adopted art as a profession. He finally joined the staff of "Punch," the pages of which he has enriched with well-known caricature sketches of society life. He is an associate of the Royal Society of Painters in Water-colors. During 1890 he published a series of essays on his art, and numerous reprints of his sketches in "Punch."

**DUMB CANE**, a plant of the natural order *Ara-cée*, remarkably differing from the plants of that order generally, in its almost arborescent character, but agreeing with them in its acidity, which is in none of them more highly developed. It has a cylindrical stem, with ringed scars and oblongo-ovate leaves. It is a native of the West Indies, and has received its English name from the property which it has of producing dumbness when chewed, its acrid poisonous juice causing an immediate swelling of the tongue, accompanied with excruciating pain. It has, however, been used medicinally.

**DUMICHEN, JOHANNES**, a German Egyptologist, born in 1833. He passed many years in Archæological research in the valley of the Nile, making a valuable collection of hieroglyphic inscriptions, drawings of monuments, and notes. He has written many treatises on Egyptian inscriptions.

**DUMMER, JEREMIAH** (1680-1739), an American scholar. From 1710 to 1721 he was in England as agent of Massachusetts. He published in both Latin and English.

**DUN**, a root common to the Celtic and Teutonic languages, signifying a hill or height. It enters extensively into the names of places (becoming often *dum*, *don*), as *Dunkirk*, *Dumbarton*, and *Donegal*.

**DUNCAN, HENRY, D.D.** (1774-1846). From 1798 he was minister of Ruthwell, in Dumfriesshire, where, in 1810, he established the first savings bank.

**DUNCAN, JOHN** (1796-1870), a Scotch Presbyterian clergyman and Orientalist. He was licensed to preach in 1825, and in 1831 became pastor of a

church in Glasgow. In 1841 he went to Pesth as missionary among Jews, and from 1843 to his death was professor of Hebrew and Oriental languages in Edinburgh.

**DUNCANSBAY HEAD** (also **DUNCANSBY**), a promontory, 210 feet high, forming the northeast extremity of Caithness,  $1\frac{1}{4}$  miles east of John O'Groats House, and 18 north by east of Wick.

**DUNCKER, MAXIMILIAN WOLFGANG**, an eminent historical writer, born in 1811 at Berlin. After studies at Bonn and Berlin he settled to the study of history at Halle, and became extraordinary professor there in 1842. His greatest work is his *History of Antiquity*, which embraces the early history of the Egyptians, Babylonians, Lydians, Persians and Indians. His other works are chiefly contributions to German and Prussian history. Died 1886.

**DUNDAS**, a town of Wentworth county, Ontario, at the head of Burlington Bay, west of Lake Ontario. It has a number of mills and manufactories. Population, 3,709.

**DUNDAS**, an island of British Columbia, 40 miles northeast of Queen Charlotte Island, and separated by Chatham Sound from the most southerly of the Alaskan Islands.

**DUNDAS**, a group of nearly 500 islets (also called the Juba Islands), all of coralline formation, lying off the east coast of Africa, in about  $1^{\circ}$  south latitude, with only one secure harbor.

**DUNDAS**, a strait in North Australia, separating Melville Island from Coburg Peninsula.

**DUNDEE**, a village of Monroe county, Mich., on the Raisin River, 44 miles southwest of Detroit. It contains flouring-mills, a pulp-mill, tannery, and factories where lumber and staves are made.

**DUNDEE**, a village of Yates county, N. Y., about 12 miles from Watkins. It has founderies, flour-mills, a brewery and a planing-mill.

**DUNDRUM BAY**, an inlet of the Irish Sea, on the east coast of Ireland, in County Down, five miles south of Downpatrick. It is 13 miles wide at the entrance, and only 5 miles long to its inmost recess, forming a long curve into the shore.

**DUNGAN, IRVINE**, lawyer, born in Canonsburg, Pa., and received a collegiate education. He served in the Union army during the war of the Rebellion, being 10 months in a Confederate prison. In politics he is a Democrat. He was elected mayor of Jackson in 1869, and member of the State Senate in 1877. He was chairman of the Democratic State executive committee in 1887, and led the Democratic electoral ticket in Ohio in 1888. In 1890 he was elected a Representative from the Thirtieth Congressional District of Ohio to the 52d Congress.

**DUNGNESS**, a headland, with a light-house, on the south coast of Kent,  $10\frac{1}{2}$  miles southeast of Rye.

**DUNGLISON, ROBLEY** (1798-1869), an Anglo-American physician. He came to the United States in 1824, and was professor of medicine till 1833 in the University of Virginia. From 1833 to 1836 he was a professor in the University of Maryland, and for more than thirty years afterward occupied a chair in Jefferson Medical College. He translated a number of foreign works, and wrote many more on medical topics.

**DUNHAM, CARROLL** (1828-77), an American physician. He practiced medicine in Brooklyn, N. Y., in 1852-58; in Newburgh in 1858-63, and from 1863 to his death in Irvington-on-Hudson. He held several important positions in various medical institutions.

**DUNKERS**. See *Britannica*, Vol. VII, p. 543.

**DUNKIRK**, a thriving city, railroad center, and port of entry of Chautauque county, N. Y., on Lake



Erie. It has a good harbor, is the western terminus of the Erie railroad, has extensive locomotive works, a grain and coal elevator and several mills and factories. The city has a system of water-works, is lighted by gas, has an orphan asylum, free reading room and library.

**DUNLAP**, a village of Harrison county, Iowa, on Boyer River, 51 miles northwest of Omaha. It has a flour-mill, a newspaper office, a fine hotel, and carries on a thriving trade.

**DUNMORE**, an important village of the Lackawanna valley, Pa., in Lackawanna county, three miles northeast of Scranton. Two railroads enter the village. The coal business is the chief employment of the town, as rich mines of anthracite are in the vicinity.

**DUNNAGE**, a name applied to miscellaneous fagots, boughs, bamboos, odd mats or sails, or pieces of wood, laid in the bottom of the hold to keep the cargo of a ship out of the bilge-water; or placed between parts of the cargo to keep them steady.

**DUNNOTTAR CASTLE**, the ancient seat, now in ruin of the Keiths, the Earls Marischal of Scotland, on the Kincardineshire coast, 1½ miles south of Stonehaven. It occupies the top of a rock 4½ acres in extent, and 160 feet high, overhanging the sea, with a deep though dry chasm between it and the mainland, and it is approached by a steep winding path. The area is surrounded by a wall. Dunnottar castle was dismantled after the rebellion of 1715, on the attainder of the last Earl Marischal.

**DUNSTANBOROUGH CASTLE**, a picturesque ruins on the basaltic sea cliffs of the Northumbrian coast eight miles northeast of Alnwick. Crystals of quartz found here are called Dunstanborough diamonds and amethysts.

**DÜNTZER**, JOHANN HEINRICH JOSEPH, a German philologist and literary historian, born in 1813. In 1836 he became privatdocent in Bonn, and in 1846 took charge of the library of the Catholic gymnasium at Cologne. He is the author of many works on philology and literary history.

**DUNWICH**, a village on the cliffs of the Suffolk coast, 4½ miles south of Southwold. In 630 it was made the Episcopal see of the Angles Southfolk, and became a large and important place. Most of its ancient buildings have been swept away by the encroachments of the sea. The population is now about 250.

**DUODECIMAL SCALE**, the name given to the division of unity into twelve equal parts, as when the foot is divided into 12 inches, the inch into 12 lines, or the pound into 12 ounces. This plan of counting has some advantage, as 12 admits of so many divisions into equal parts. But the decimal scale, or division into ten equal parts, is now universally recognized as preferable for its coinciding with our decimal system of notation.

**DUODECIMALS**, a method of calculating the area of a rectangle when the length and breadth are stated in feet and inches.

**DUPIN**, FRANÇOIS PIERRE CHARLES (1784-1873). Baron, a French economist. He served as an engineer under the Empire, and was made baron in 1824, a peer in 1837, and filled several posts, which he resigned in 1852.

**DUPONCEAU**, PIERRE ÉTIENNE (1760-1844), an American author, born in France. He came to America in 1777 and was admitted to the practice of law about 1784. His best work is, *Mémoire sur le Système Grammatical des Langues de quelques Nations Indiennes de l'Amérique du Nord*. He also wrote many legal works.

**DU PONT**, SAMUEL FRANCIS (1803-65), a United States naval officer. In 1815 he became a midship-

man in the navy; was made sailing-master in 1824; was promoted lieutenant in 1826; commander in 1842; captain in 1855; flag-officer in 1861, and rear-admiral in 1862. During his service he was almost constantly employed on duties of importance, and invariably acquitted himself to the entire satisfaction of the Government.

**DÜPPEL**, or DYBBÖL, a village in the Prussian province of Sleswick-Holstein, 15 miles northeast of Flensburg. In 1848 its fortifications were stormed by the Germans, and again on April 18, 1864, by the Prussians after a month's bombardment.

**DUPUY**, ELIZA ANN, author, born in Petersburg, Va., about 1814, and died in New Orleans in January, 1881. She became a governess at an early age, and while thus occupied wrote her first book, *The Conspirators*. Among other works are: *The Huguenot Exiles*; *Celestine*; *Separation*; *Concealed Treasure*; *Ashleigh*; and the *Country Neighborhood*. Many of her stories were written for the New York "Ledger."

**DUQUOIN**, a city and railroad junction of Perry county, Ill., 71 miles southeast of St. Louis. Bituminous coal is mined here by four companies in twelve mines. The city has a park, a public library, machine shops, flouring-mills, and salt-works.

**DURA DEN**, a small glen, between Cupar and St. Andrews, in Fife, through which runs a tributary of the Eden. It has become famous on account of the numerous and beautifully preserved fossil fish entombed in its yellow sandstone, which belongs to the upper beds of the Old Red Sandstone.

**DURAMEN**, or HEART WOOD, the inner and fully ripened wood of dicotyledonous trees. The division is often very marked between the *duramen* and the *alburnum*, or sap-wood, the former being more dense and compact, and also frequently of a darker color, as most notable in ebony. As timber it is much more valuable and durable than the alburnum.

**DURANCE**, an unnavigable river of Southeast France. It rises in the department of the Hautes-Alpes, and joins the Rhone 3 miles below Avignon, after a course of 225 miles. An aqueduct from it, 51 miles long, supplies Marseilles with water, and irrigates 25,000 acres of land.

**DURAND**, ASHEE BROWN, an American artist, born in Jefferson, N. J., Aug. 21, 1796, died in South Orange, Sept. 17, 1886. He early acquired some skill in the elementary processes of engraving, and in 1812 was apprenticed to an engraver in New York city, with whom he subsequently entered into partnership. His first original work was *A Beggar*, after a painting by Samuel Waldo, and his next *The Declaration of Independence*, the best-known engraving in the United States. Among other of his works are *Musidora*, engraved in 1825, *General Jackson* in 1828, and many heads executed for the *National Portrait Gallery*. He also contributed extensively to the "annuals." Becoming dissatisfied with the limits of engraving, he turned to landscape painting, which was his occupation from 1836. His landscapes include *The Catskills from Hillsdale*; *The Franconia Mountains*; *The Rainbow*; *Primeval Forest*; *Franconia Notch*; and *A Mountain Forest*, his largest canvas. *Kauterskill Cove*, *Il Pappagallo* and *Studies from Nature* were exhibited at Philadelphia in 1876. He was one of the founders of the National Academy of Design, of which he was president from 1845 to 1861.

**DURANT**, HENRY TOWLE, philanthropist, born in Hanover, N. H., Feb. 20, 1822, died in Wellesley, Mass., Oct. 3, 1881. He graduated at Harvard in 1841, studied law with Gen. Butler, was admitted

to the bar, and began the practice of his profession in Boston. He soon became prominent, and was associated with Rufus Choate and other noted lawyers. At the death of his only son in 1863, he gave up his law business, resolving to consecrate his life and fortune to the cause of religion. Recognizing the need of an institution for the higher education of women, he built and equipped Wellesley College, at an expense of \$1,000,000, and the institution has since been maintained through his liberality. From 1864 Mr. Durant was a lay preacher, until compelled by failing health to discontinue public exhortation.

**DURAZZO**, a maritime town of Albania, European Turkey, is built on the rocky peninsula of Peli, in the Adriatic. Lat. 41° 19' N, long. 19° 27' E. It is fortified, and is a place of considerable antiquity. Its situation in a fertile district gives it an export trade in grain, oil, etc.; but in recent years, owing to partial failures in crops, and disease in olives, the exports have been small.

**DURBAR**, a state reception of the governor-general of India, or one of the native princes. Specially memorable is the great durbar held by Lord Lytton at Delhi on Jan. 1, 1877, when Queen Victoria was proclaimed Empress of India.

**DURBIN**, ELISHA, a distinguished Catholic missionary, was born in Kentucky in 1800. He became a priest in 1822; and in 1824 he entered the missionary field in his native State. He has been one of the most indefatigable propagandists of modern times; having traveled, in the distinctive work of his life, nearly three-quarters of a million miles, mostly on horseback.

**DURBIN**, JOHN PRICE, an eminent Methodist minister, was born in Kentucky in 1800. He became a traveling preacher in 1819; was chaplain of the Senate 1831; became editor of the "Christian Advocate" 1833; was for many years president of Dickinson College, and became secretary of the Missionary Society in 1850. He died in 1876.

**DURBOROW**, ALLAN C., a business man, born in Philadelphia, Nov. 10, 1857. He was educated in Indiana, was connected with mercantile houses in Chicago, and was the business manager of a weekly trade journal in that city. In politics he is a Democrat, and in 1890 was elected a Representative from the Third Congressional District of Illinois to the Fifty-second Congress.

**DURESS**, in English law, is the plea of a man who has obliged himself to pay or perform, or who has committed a misdemeanor, under compulsion by restraint of liberty, or threat of loss of life and limb. In such cases he may plead to be held free of the consequences.

**DURFEE**, JOB, an American jurist, was born in Rhode Island in 1790, and died in 1847. He held important offices under government; and in 1835 he became chief justice of the supreme court of Rhode Island.

**DURFEY**, THOMAS, a writer of plays and poems in the reign of Charles II., with whom he was a favorite for his wit, liveliness, and songs. In literature he is best remembered for his sonnets, entitled *Pills to Purge Melancholy*, a work found only among the rarities of private libraries. Tom Durfey as he was usually called, lived to entertain Queen Anne by singing his catches and glees; but being without any settled means of support, he concluded his career in poor circumstances in 1723.

**DURHAM**, the county-seat of Durham county, N. C., 25 miles northwest of Raleigh. It contains a female college and extensive tobacco manufactories.

**DURHAM**, JAMES, a Covenanting minister, born at Easter Powrie, in Forfar in 1822, died June 25,

1858. He studied at St. Andrews; fought as captain in the civil war, and became a preacher in 1847. He was chaplain to Charles II in 1650-51, and subsequently minister in Glasgow till his death. He left numerous sermons and several expository works.

**DURIVAGE**, FRANCIS ALEXANDER, author, born in Boston, Mass., in 1814, died in 1881. He was author of numerous popular tales, poems, and plays. In connection with W. S. Chas. he translated Lamartine's *History of the Revolution of 1848*, and was for a time co-editor of *Ballou's Pictorial*. He also published *A Cyclopædia of History* (Hartford, 1836), and *Life Scenes from the World Around Us* (Boston, 1853).

**DURKEE**, CHARLES, an American statesman, born in Royalton, Vt., Dec. 5, 1807, died in Omaha, Neb., Jan. 14, 1870. He was educated in his native town and in the Burlington Academy, subsequently emigrating to the territory of Wisconsin. Here he was elected a member of the first territorial legislature; was again a member of the legislature in 1847, and in 1848 was elected to the first State legislature. A member of Congress in 1849-53, he was in 1855 chosen United States Senator from Wisconsin; was a member of the Peace Congress in 1861, and was appointed Governor of Utah in 1865.

**DURRENSTEIN**, a village of Lower Austria, on the left bank of the Danube, 45 miles west-northwest of Vienna. In its ruined castle Richard Cœur-de-Lion was confined for three months by Leopold of Austria. Population, 650.

**DURSLEY**, a town of Gloucestershire, near the Cotswold Hills, 15 miles southwest of Gloucester by rail. Near it are quarries of Bathstone. Population of parish, 2,344.

**DURTHALER**, JOSEPH, clergyman, born in Ste. Marie-au-Migne, Alsace, in 1819, died in New York in 1885. He was educated at the Lyceum of Strasburg and at the University of France; studied theology in the seminary of Strasburg, and became a Jesuit in 1844. At the time of the revolution of 1848 he came to the United States, and was sent on the Indian mission. Transferred to St. Francis Xavier College, New York, he built the new college, made it legally a collegiate institution, extended the scientific course, and founded its fine collections. In 1863 he resigned the presidency of the College and went to Buffalo, where he founded the classical school which developed into Canisius's College. In 1871 he was again at St. Francis Xavier College, in 1875 became rector of St. Joseph's Church, New York, and afterwards founded a convent and school of the Sisters of Notre Dame.

**DURUY**, VICTOR, historian and educator, born in Paris, Sept. 11, 1811. Destined for a designer in the Gobelins tapestry-works, he showed singular aptitude for learned studies. In 1833 he became professor of history in the Collège Henri IV. From 1863 to 1869 he was minister of public instruction. He published numerous and important works. In 1867 he became a Grand Officer of the Legion of Honor, and in 1885 a member of the Academy.

**DUSTIN**, HANNAH, pioneer, born about 1660, was the wife of Thomas Dustin, of Haverhill, Mass. In the spring of 1697 Mrs. Dustin, with her infant and nurse, were captured and carried off by the Indians, her husband and seven children escaping. After witnessing the destruction of her home and the murder of her infant, she was taken by her captors to an island at the junction of the Merrimac and Contoocook Rivers, near the present site of Concord, N. H., enduring the greatest hardships on the long march. Being told by the chief that the prisoners would be obliged to run the gauntlet, Mrs.



Dustin resolved to escape. Assisted by a lad from Worcester, who had been in captivity for some time, she secured a tomahawk, herself killed and scalped nine of the sleeping savages, and escaped with her companion, reaching Haverhill after many hardships. To the governor in Boston she presented the trophies of her victory—a gun, tomahawk, and the scalps of the savages. In recognition of her heroism the general court gave to Mrs. Dustin and her companion \$250 each. The island mentioned above is now called Dustin's Island, and there in 1874 the Commonwealths of Massachusetts and New Hampshire erected a granite monument inscribed with the names of Hannah Dustin, Mary Neff, the nurse, and Samuel Leonardson, the English boy.

**DUTCH EAST INDIES**, a name applied collectively to the Dutch possessions in the East Indies, including Java and Madura, Sumatra, Borneo, Riau-Lingga Archipelago, Banca, Billiton, Celebes, Molucca Archipelago, and the small Sunda Islands. They are situated between 6° N. and 11° S. latitude, and between 95° and 141° E. longitude. In 1602 the Dutch created their East India Company. This company slowly conquered the Dutch East Indies, and ruled them during nearly two centuries. After the dissolution of the Company in 1798, the Dutch possessions were governed by the mother-country. Politically the territory, which is under the sovereignty of the Netherlands, is divided into (1) lands under direct government, (2) vassal lands, and (3) confederate lands. With regard to administration, it is divided into residencies, divisions, regencies, districts, and *dessas* (villages). For earlier information concerning the countries of Dutch East India, see those countries severally in these volumes. The following table gives the area and population of Java, including Madura, and the outposts, either official or carefully estimated:

| Territorial Divisions.                | Area:<br>English<br>square miles | Population<br>end of 1888. |
|---------------------------------------|----------------------------------|----------------------------|
| Java and Madura.....                  | 50,848                           | 22,430,043                 |
| Sumatra, West Coast...                | 46,300                           | 1,190,791                  |
| Sumatra, East Coast...                | 16,282                           | 277,801                    |
| Bengkulu.....                         | 9,576                            | 152,808                    |
| Sumatra { Lampongs.....               | 9,975                            | 123,891                    |
| Palembang.....                        | 61,152                           | 637,197                    |
| Atjeh.....                            | 6,370                            | 542,673                    |
| Riau-Lingga Archipelago.....          | 17,325                           | 94,743                     |
| Banca.....                            | 4,977                            | 76,351                     |
| Billiton.....                         | 2,500                            | 38,635                     |
| Borneo, West Coast.....               | 58,926                           | 413,694                    |
| Borneo, South and East Districts..... | 144,788                          | 677,939                    |
| Island of Celebes.....                | 45,150                           | 402,211                    |
| Celebes { Menado.....                 | 26,000                           | 446,986                    |
| Molucca Islands.....                  | 42,420                           | 852,023                    |
| Timor Archipelago.....                | 21,840                           | 45,333                     |
| Bali and Lombok.....                  | 3,990                            | 1,363,806                  |
| New Guinea to 141° E. long.....       | 150,755                          | 200,000                    |
| Total.....                            | 719,674                          | 29,475,613                 |

The total revenue, according to the budget estimates for 1891, is 116,414,315 guilders, and the expenditure 136,840,646 guilders, showing a deficit of 20,426,331 guilders. About one-third of the annual expenditure is for the army and navy, and another third for the general administration, both in Java and in the Netherlands.

In 1888 there were in Java 52 sugar estates of 15,570 bahu, yielding 1,867,814 picols (1 picol=61.76 kilogrammes), or 88.93 per bahu. The production of coffee in Dutch India in 1888 was 1,178,920 picols.

The production of cinchona in kilogrammes at Java during the same year was 1,750,516. In 1888 the number of tobacco plantations in Java was 118, producing 12,556,826 kilogrammes, and in Sumatra (Deli, etc.) 201, with a produce of 16,681,480 kilogrammes. The production of tea in Java in 1888 was 3,014,209 kilogrammes. There were also 115 indigo plantations, yielding 805,413 kilogrammes of indigo.

**DUTCH FLAT**, a mountain-village of Placer county, Cal., 67 miles northeast of Sacramento. There are productive hydraulic gold mines here.

**DUTCH-GAP CANAL**, a cut through a narrow isthmus of the peninsula called Farrar's Island, in the James River, in Henrico county, Va. It is 5 miles below Richmond, and was constructed by order of Gen. B. F. Butler during the civil war for military purposes, but was of little value then, although it now saves a trip of seven miles in navigating the river between Richmond and City Point.

**DUTCH LIQUID**, an oily substance obtained by mixing chlorine and olefant gases, which combine and yield Dutch liquid, with the formula  $C_2H_4Cl_2$ . It has a specific gravity of 1.271 (water=1.000), boils at 185° (85°C.), is not miscible with water, but readily dissolves in ether and alcohol. It produces anæsthesia like chloroform, but the great difficulty of preparing it retards its use.

**DUTCH METAL**, also called *Dutch gold* or *Dutch leaf*, an alloy of copper and zinc; in other words, it is a kind of brass containing a large percentage of copper. It is made in the same manner as gold-leaf. It dissolves in strong nitric acid; true gold-leaf does not. Ordinary Dutch metal is yellow, but a white kind is made.

**DUTCH WEST INDIES**. The Dutch possessions in the West Indies are Surinam, or Dutch Guiana (see Britannica, Vol. XI, pp. 251-253), and the colony of Curacao (see Britannica, Vol. VI, p. 709). The area of Surinam is 46,060 sq. miles, and the population, Jan. 1, 1889, 57,365, inclusive of the negroes living in the forest. The capital is Paramaribo, having 27,752 inhabitants. There were, in 1888, 47 schools, with 114 teachers and 5,548 pupils. The productions for 1888 were: Sugar, 6,206,553 kilogrammes; cacao, 1,543,019 kilogrammes; bananas, 516,799 bundles; coffee, 5,560 kilogrammes; cotton, 720 kilogrammes; rice, 15,197 kilogrammes; fruits, 186,812 kilogrammes; rum, 315,306 litres; and melasse, 1,104,389 litres. Gold was discovered in 1876, and the declared value of that product to Jan. 1, 1889, was 11,347,572 guilders. The total value of the imports in 1889 was 4,893,355 guilders, and of the exports 3,521,867 guilders.

Dutch Curacao (only the southern part belongs to the Netherlands, the northern to France) has an area of 403 sq. miles, and a population of 46,461. Jan. 1, 1889, there were 23 schools, with 3,995 pupils. The revenue for 1890 was estimated at 597,000 guilders, and the expenditures at 672,000 guilders. The chief products are corn, beans, pulse, cattle, salt, and lime.

**DUTTON, HENRY**, an American jurist, born in Plymouth, Conn., Feb. 12, 1796, died in New Haven, Conn., April 12, 1869. He graduated at Yale College in 1818, studied law in Fairfield, Conn., and established himself in practice at Newtown, where he remained fourteen years, and was twice elected to the legislature. After his removal to Bridgeport he became State attorney, and was again member of the legislature for two terms. In 1847 he became professor of law at Yale, and removed to New Haven. In 1849 he was elected to the State Senate; in 1854 was elected governor of Connecticut, and was judge of the Superior Court and of the

supreme court of errors from 1861 to 1866. It was largely due to Judge Dutton's efforts that the passage of the law allowing parties to a suit to testify in civil cases was secured, and he aided in the passage of bills to secure more effectually the rights of married women.

DUVAL, CLAUDE (1643-'70), a highwayman, born at Domfront, Normandy, in 1643. He went to England at the Restoration in the train of the Duke of Richmond. Taking soon to the road, he robbed many persons, until captured while drunk; he was then hanged at Tyburn, Jan. 21, 1670, and was buried in Covent Garden church.

DUYCKINCK, EVERT AGUSTUS, an American author, born in New York city, Nov. 23, 1816, died there Aug. 13, 1878. He graduated at Columbia in 1835, studied law and was admitted to the bar, but subsequently devoted himself to literature. In conjunction with Cornelius Mathews he edited the "Arcturus" in 1840-'42, and in 1847 he became editor of the "Literary World," which was carried on by himself and brother George to the close of 1853. In 1854 the brothers engaged in the preparation of *The Cyclopaedia of American Literature*. Mr. Duyckinck published a *History of the War for the Union* (3 vols., 1861-'65); *National Gallery of Eminent Americans* (2 vols., 1866); *History of the World* (4 vols., 1870), and *Biographies of Eminent Men and Women of Europe and America*.

DUYCKINCK, GEORGE LONG, an American writer, born in New York city, Oct. 17, 1823, died there March 30, 1863. He graduated from the University of New York in 1843, studied law and was admitted to the bar. He was associated with his brother Evert in the editorship of the "Literary World," and in the preparation of the *Cyclopaedia of American Literature*—subsequently devoting himself to the biographical literature of the Protestant Episcopal Church. He was author of *Life of George Herbert* (1858), followed by lives of Bishop Thomas Ken (1859); *Jeremy Taylor* (1860), and *Hugh Latimer* (1861).

DUYSE, PRUDENS VAN, a Belgian writer, was born in Dendermonde, in Belgium, September 28, 1804. After completing his academical career, he was appointed archivist of his native town, from which he was removed to the same office in Ghent. He soon afterwards received the office of Professor of National History in the Athenæum, and was made a member of various learned societies both in Belgium and France. He died November 13, 1859. He was one of the chief contributors to the revival of Flemish literature. As a poet, he was less remarkable for genius than for prodigious fertility; his pieces all bear the stamp of improvisation, of which he was a great master.

DVORÁK, ANTONÍN, a Bohemian composer, born at Mühlfhausen near Kralup, in the Prague district, Sept. 8, 1841. In 1857 he began study at Prague, which has since been his headquarters. The characteristics of his compositions are: (1) the strong Czech element which pervades them, and displays itself in characteristic rhythmical effects and rational tonalities; (2) the economical and clever use of thematic material; and (3) the large amount of irrelevant "padding" which never rises to the level of Schubert's *Himmliche Länge*. His *Stabat Mater* is probably his greatest work.

DWARF (A. S. *dweorg*, *dwegr*, or *dweorh*; cf. Icel. *dvergr*, Ger. *zwerg*) is a term applied to any organized being, but especially to the human species, whose height is much less than the average height of their race. The word is often restricted to those cases where there has been a uniform and general arrest of growth, except perhaps in the nervous system, which is often fully developed in dwarfs.

DWARFED TREES, characteristic ornaments in Chinese and Japanese houses and gardens. Their production depends upon the prevention of an abundant flow of sap. The trees are planted in small flower-pots, and are very sparingly supplied with water; their strongest shoots are pinched off, and their branches bent and twisted in various ways. These trees often abound in flowers and fruit.

DWELLINGS FOR THE POOR. The subject of dwellings built especially for the working classes has been much discussed of late years, especially in England, and great numbers of such dwellings have been erected by philanthropists and by benevolent societies. Those built in London are estimated to cost from 12 to 16 cents per cubic foot, the sites costing from 50 cents to \$1.25 per square foot, the whole outlay being \$180 per occupant, which involves an average rent of 50 cents a week per room. The Peabody Buildings in 1885 showed an outlay of \$4,500,000, including \$2,500,000 given by the founder and \$2,000,000 borrowed from the government. They had 11,300 rooms, occupied by 20,400 persons, or 5,070 families, each family had weekly earnings that averaged \$6 and the average rent was \$1.18, or 52 cents per room. The gross rental was \$300,000; expenses and interest on loan \$150,000; net profit \$150,000. In 1882 Messrs. Guinness built in Dublin a block holding 540 rooms to accommodate 180 families at \$1 a week. Sir Edward Guinness in 1889 gave \$1,000,000 for a similar purpose in London. The town council of Dublin also built a block for 1,200 persons, on land which was bought at \$33,000 per acre; cost \$200,000; average rent, \$1 a week.

DWIGHT, a railroad junction of Livingston county, Ill., 72 miles southwest of Chicago. It has several banks, churches, warehouses, and newspaper offices.

DWIGHT, BENJAMIN WOODEIDGE, grandson of President Timothy Dwight of Yale College, was born in New Haven in 1816. He studied theology, and removed to Joliet, Ill., in 1844, where he founded a Congregational church. He was for a short time editor of the "Interior" in Chicago. He was for some years tutor at Hamilton College, Clinton, where he has spent much of his life. His literary works are mostly religious.

DWIGHT, BENJAMIN WOOLSEY, son of Timothy Dwight of Yale, was born in Massachusetts in 1780. He was in early life a physician, and wrote a valuable treatise on *Chronic Debility of the Stomach*. He became a farmer near Clinton, and was for many years treasurer of Hamilton College. He died in 1850.

DWIGHT, EDMUND, an American philanthropist, was born in Massachusetts in 1780. He became a noted merchant; amassed a large fortune, and was the founder of Holyoke, Chicopee and Chicopee Falls. He took an active interest in educational enterprises, and gave large sums of money toward the establishment of the normal school system. He died in 1849. His son EDMUND, born in 1824, is noted for his interest in the raising and distributing of the fund for the relief of the sufferers by the Franco-Prussian war.

DWIGHT, JOHN SULLIVAN, an American musical writer, was born in Boston in 1813. He was for some time pastor of a Unitarian church. He was one of the founders of Brook Farm. Since 1848 he has been known as an able and independent musical critic.

DWIGHT, HARRISON GRAY OTIS, an American missionary and explorer, and one of the founders of the Armenian mission, was born in Massachusetts, in 1803, and died in 1862.



DWIGHT, NATHANIEL, an American physician, born in Northampton, Mass., Jan. 31, 1770, died in Oswego, N. Y., June 11, 1831. He studied medicine in Hartford, Conn., became assistant surgeon in the United States army, afterwards practicing in towns of Connecticut and Massachusetts. Dr. Dwight was one of the earliest advocates of the present system of retreats for the insane, prepared the first school geography published in this country, and was author of *The Great Question Answered*, and a *Compendious History of the Signers of the Declaration of Independence*.

DWIGHT, SERENO EDWARDS, D.D., an American educator, born at Greenfield Hill, Conn., May 18, 1786, died in Philadelphia, Pa., Nov. 30, 1850. He graduated at Yale in 1803, studied law and practiced successfully in New Haven. Entering the ministry in 1816, he was chaplain of the United States Senate in 1816-17, and was then ordained pastor of the Park Street church, Boston, where he remained till 1826. He then returned to New Haven, engaged in literary work, and in connection with his brother Henry conducted a boarding-school for boys. In 1833 he was chosen president of Hamilton College, resigning the position in 1835.

DWIGHT, THEODORE, journalist, born in Northampton, Mass., Dec. 15, 1764; died in New York city, July 12, 1846. He studied law; was admitted to the bar, and became engaged in many of the political controversies as a Federalist. After serving in the State senate he was elected to Congress in 1806. He edited the *Hartford Mirror* during the war of 1812, and was secretary of the Hartford convention in 1814. In 1815 he became editor of the *Albany Daily Advertiser*, and in 1817 he removed to New York, where he founded the *Daily Advertiser*, which he edited until 1836. Mr. Dwight published *A History of the Hartford Convention* (1833), and the *Character of Thomas Jefferson as Exhibited in His Own Writings* (1839). He was a brother of Timothy Dwight, president of Yale college.

DWIGHT, THEODORE WILLIAM, a grandson of Timothy Dwight, of Yale, was born in Catskill, New York, in 1822. He was for some years professor of political economy and law at Hamilton College; and was afterwards professor of municipal law in Columbia College, and warden of the law-school of that institution. He has lectured and written extensively on law, and has held a number of important offices.

DWIGHT, TIMOTHY, an eminent American educator, grandson of President Timothy Dwight, of Yale, was born in Norwich in 1828. He was educated at Yale; was for many years professor of sacred literature in Yale Theological seminary; and in 1886 became president of Yale College.

DWIGHT, WILLIAM BUCK, an American scientist, was born in Turkey in 1833. He is a graduate of Yale Scientific School. He has been a successful teacher in several educational institutions; and has spent much of his life in geological investigations.

DYAKS, or DAYAKS, is the Malay name for the race who constitute the bulk of the aboriginal population of Borneo, divided into innumerable tribes, differing pretty widely in language, customs, and degrees of savageness. Physically they closely resemble the Malays, to whom they are doubtless akin, but are somewhat taller; they are intelligent, hospitable, and unsuspicious, and greatly excel the Malays in truthfulness and honesty. Many of the dialects spoken by them are little known; but they seem all to fall into some five great geographical groups. The coast tribes have adopted many Malay words, and some have completely adopted the Malay speech. Even the most uncivilized

tribes have many ingenious arts and industries, weave cloth, make excellent steel weapons, and erect most serviceable suspension bridges with bamboo poles and withes. Their chief weapon is the Blowpipe, not the bow. The barbarous custom of systematic "head hunting" is dying out, though the heads of enemies are still cherished trophies of the warrior. The Sea-Dyaks were long famous as untamable pirates.

DYE-STUFFS. The substances used in dyeing as the sources of coloring matter, are mostly derived from the vegetable and animal kingdoms, the far greater number of them from the former. To the animal kingdom and to the class of insects, we are indebted for *Cochineal*—and consequently for *Carmin*—*Kermes* and *Lac*, and less directly for *Galls*. The *Tyrian purple* of the ancients is also said to have been a product of the animal kingdom, obtained from a mollusc. The dye-stuffs obtained from the vegetable kingdom are numerous, and in every part of the world there are some in domestic use, which have not become articles of commerce. The most recent discovery of importance in dyeing, is the extraction of colored substances of great beauty from coal-tar, and the application of these to the coloring of cloth. At the present time, these dyes of coal-tar origin are most extensively employed, and give rise to the fashionable colors named Aniline, purples, Tyrian purple or Mauve, Violine, Roseine, Fuchsine or Magenta, Solferina, Bleu de Paris, Aniline green or Emeraldine, Azuline, etc. The condensable product or gas liquor obtained during the destructive distillation of coal in gas-works, consists of aqueous matter holding salts of ammonia in solution, and tar with naphtha. The tar consists of a numerous class of bodies, of which aniline and benzole are two. The aniline is present in minute quantity; and for manufacturing purposes, means are generally resorted to for the conversion of the benzole of gas-tar into aniline. The process followed on the commercial scale is to act upon the benzole by nitric acid, by which it is converted into nitro-benzole, and thereafter, by the action of acetate of the protoxide of iron, it becomes aniline.

DYER, ALEXANDER BYRDIE, an American general, born in Richmond, Va., Jan. 10, 1815, died in Washington, D. C., May 20, 1874. He graduated at the United States Military Academy in 1837; was chief of ordnance of the army invading New Mexico in 1846-48, and was afterwards in command of the North Carolina arsenal. From 1861 to 1864 he was in command of the Springfield armory, and in the latter year was placed in charge of the ordnance Bureau in Washington, D. C., with the rank of brigadier-general. In March, 1865, he was brevetted major-general, United States army, for distinguished services. He was the inventor of the Dyer projectile for cannon.

DYER, GEORGE, antiquary and scholar, born in London, March 15, 1755, died in Clifford's Inn, March 2, 1841. He studied first at Christ's Hospital, and afterwards at Emmanuel College, Cambridge, which he entered in 1774. He took his degree of B. A. in 1778. During the next fourteen years he was tutor and usher, chiefly at Cambridge. In 1792 he settled in London, where he devoted his time to literature, and produced many works of note. He was a man of remarkable straightforwardness and honesty of character.

DYER, ELIPHALET, jurist, born in Windham, Conn., Sept. 26, 1721, died there May 13, 1807. He graduated at Yale in 1740, studied law and was admitted to practice in 1746. During the French and Indian Wars he was lieutenant-colonel of a regiment sent against Crown Point in 1775, and was

afterwards made colonel of a regiment. He was the originator of the plan to establish a Connecticut colony in the valley of the Susquehanna, and in 1763 was sent to England as agent of the company. A delegate to the first Continental Congress in 1774, he was a member of each succeeding Congress, with the exception of those of 1776 and 1777 and became member of the Committee of Safety in 1775.

DYER, THOMAS HENRY, an English historian, born in 1804. He visited Athens, Rome, and Pompeii, and studied their ancient topography. He is the author of many valuable historical works.

DYERSBURG, the county-seat of Dyer county, Tenn., on the north fork of the Forked Deer River, 45 miles northwest of Jackson. It contains a carriage factory, foundry, grist-mill, saw-mill, hotels, and newspaper offices.

DYERSVILLE, a village of Dubuque county, Iowa, situated on Beaver Creek and containing a flouring-mill and breweries.

DYKES, JOHN BACCHUS, composer, born at Hull, March 10, 1823, graduated at Cambridge; was ordained in 1847, and appointed precentor of Durham cathedral in 1849. In 1861 he received the degree of Mus. Doc. from the University of Durham, and in 1862 was presented to the vicarage of St. Oswald's in that city. Dr. Dykes was a joint-editor of *Hymns Ancient and Modern*, and composed many anthems and hymn-tunes, among which are *Lead Kindly Light*, *Nearer My God to Thee*, and *Jesus Lover of My Soul*.

DYMOKE, the name of a Lincolnshire family, who for nineteen generations held the office of champion of England.

DYSCRASIA, a pathological term, much used in Germany by certain authorities, to indicate an altered condition of the blood and fluids of the system leading to constitutional diseases, as dropsy, cancer, lead-poisoning, etc.

DYSOLIL, a yellow or grayish laminated bituminous mineral, often found with lignite. It burns vividly, and diffuses an odor of asafetida.

DYSURIA, a difficulty in passing urine. It may depend on a variety of causes.

DYTISCUS, a genus of water-beetles. See *Britannica*, Vol. VI, p. 128, 130.

DYVOUR, in the old legal language of Scotland, a bankrupt, who, under various acts from 1606 to 1696, was until discharged compelled to wear a hideous costume. The act prescribed "a bonnet partly of a brown and partly of a yellow color, with uppermost hose or stockings on his legs, half-brown and half-yellow colored, conforming to a pattern delivered to the magistrates of Edinburgh." This barbarous usage was abandoned long before it was abolished by law in 1836.

DZIGGETAI, or DZEGGETAI, a species of wild ass, more horse-like than the others. It is probably the hemionus ("half-ass") of Herodotus and Pliny. It inhabits the elevated steppes of Tartary, extending into the south of Siberia and to the borders of India. The dziggetai lives in small herds, sometimes of several males and several females, sometimes a single male with about twenty females and foals. The Mongols and Tungus hunt it eagerly on account of its flesh; but its fleetness, watchfulness, and endurance often secure its safety. It has been partly domesticated, but does not seem to breed in captivity. It is also called kiang, khur and goor. See *Britannica*, Vol. XII, p. 175.











